

**Bureau  
of  
Materials and Physical  
Research**

**Quarterly  
Management Report  
on  
Research Progress**

**Quarter Ending December 31, 2005**

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# PROGRESS REPORT FOR QUARTER ENDING DECEMBER 2005

Project Title: Superpave Bituminous Mixture II - 4.75		Today's Date: 01/13/2006					
		Function Code: IHR-R06					
		Project Number:					
QPR Author Name: Aaron Toliver		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 0564    % Project Completed: 35%				JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Preliminary Distress Surveys at Project Locations		5/2003	8/2003				C
Task 2: Field Testing and Construction Observation		8/2003	10/2000				C
Task 3: Construction Data Compilation		10/2003	6/2004				C
Task 4: Yearly Distress Surveys at Project Locations - 5 Yr.		5/2004	9/2008				I
Task 5: Long Term Performance Data Analysis		9/2004	12/2008				I
Task 6: Final Report and Recommendations		1/2009	4/2009				I
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Aaron Toliver telephone: (217) 782 - 0564 e-mail:toliverat@dot.il.gov		P. I. Organization Name/Address: IDOT - BMPR 126 E. Ash Street Springfield, IL 62704		Co-Investigator Name/Contact: Laura Shanley telephone: (217) 524 - 7269 e-mail:shanleyll@dot.il.gov			
Description of Research: Evaluate the costs, constructability and performance of SUPERPAVE Bituminous Concrete Mixture IL - 4.75 (IL - 4.75). The results of this evaluation will be used to determine if IL - 4.75 is suitable for widespread application as a level binder on non-interstate highways. The findings may be used to suggest revisions to the IL - 4.75 contract special provision, or to suggest further research, if needed.				Keywords: SUPERPAVE, Sand Mix, IL-4.75, 4.75 mm NMAS, permeability, compaction, reflective cracking, overlay, blisters			
Technical Review Panel Names:		TRP Telephone: (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) -	TRP Email:		Meeting Dates: /    / /    / /    / /    / /    / /    / /    /	Minutes Available?	
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected:				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Superpave Bituminous Mixture II - 4.75	Today's Date: 01/13/2006
	Function Code: IHR-R06
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Detailed preliminary surveys of existing pavement distresses at the four (4) test locations were conducted to determine the location, severity and probable causes of existing pavement distresses prior to overlay.</p> <p>Data Collection Vehicles (DCVs) were dispatched to the test locations prior to construction for further assessment of preliminary pavement condition, including rutting and pavement smoothness. Follow-up surveys by the DCVs are to occur every year of the five (5) year study period, if funding permits; otherwise, DCV data collected every two (2) years for Condition Rating Surveys will be utilized.</p> <p>Bid Tabulations were compiled for calculation of the initial construction costs.</p> <p>Construction observation and field testing were completed at the test locations, with data collected regarding in-situ density and permeability, laboratory density, bituminous mix design, and aggregate gradation of the experimental and control level binders.</p> <p>Frictional properties of the IL - 4.75 level binder were gathered at two (2) of the test locations for consideration of IL - 4.75 as a surface mix at a future date.</p> <p>The process of compiling the pre-construction and construction field test data is complete.</p> <p>The second of (5) five annual distress surveys at each location were completed in October 2005.</p> <p>The second of (5) five annual DCV "follow-up" surveys at each location were completed in Fall 2005.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Te-30 High Performance Rigid Pavments - Alternative Dowel Bar Materials			Today's Date: 01/26/2006				
			Function Code: IHR-R06				
			FY 2006				
QPR Author Name: Mark Gawedzinski, P.E.		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 782 - 2799	% Project Completed: 60%			JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Monitor traffic and FWD data from four test sites		07/1996	/	I	I	I	I
Task 2: Perform initial FWD testing on fifth test site. Install traffic classifiers at fifth test site		04/2005	10/2005		I	I	I
Task 3: Install round FRP dowel bars at fifth test site		08/2005	10/2005			I	C
Task 4:		/	/				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Mark Gawedzinski, P.E. telephone: (217) 782 - 2799 e-mail:gawedzinskij@dot.il.gov		P. I. Organization Name/Address: IDOT BMRP 126 E Ash St Springfield IL 62704		Co-Investigator Name/Contact:  telephone: (    )    - e-mail:			
Description of Research: Continued monitoring of alternative dowel bar materials in accordance with FHWA TE-30 High Performance Rigid Pavment Program.				Keywords: concrete pavement, alternative dowel bar, FRP dowels, FRP tubes, Stainless steel dowels, stainless steel tubes			
Technical Review Panel Names:	TRP Telephone: (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) -	TRP Email:	Meeting Dates: / / / / / / / / / / / / / /	Minutes Available?			
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected:					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of Alternative Dowel Bar Materials (FHWA TE-30 Program)	Today's Date: 01/26/2006 Function Code: IHR-R06
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Monitoring traffic classification and FWD performance at four sites across Illinois. Installed elliptical steel dowel bars at a fifth site, performed initial FWD testing at the site. FRP round installed in NB US67, 20 baskets installed 11 bars per mfg. modular baskets. Baskets failed at 5 of 20 joints. Bars intact. FWD testing complete 10/17/05. Waiting for extreme cold for joints to open (2-3/06) for additional FWD testing</p>	



# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Resin Modified Pavement		Today's Date: 1/27/06					
		Function Code: IHR-R06					
		FY 2006					
QPR Author Name: Mark Gawedzinski		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 782 - 2799    % Project Completed: 85%				JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Develop and cast Open Graded Asphalt Bricks		06/2004	09/2005	I	I	C	
Task 2: Develop cement grout		02/2005	09/2005	I	I	C	
Task 3: Test RMP samples		04/2005	12/2005	I	I	I	C
Task 4: Search for field trial.		09/2005	/				I
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Mark Gawedzinski telephone: (217) 782 - 2799 e-mail: gawedzinskij@dot.il.gov		P. I. Organization Name/Address: IDOT BMPR 126 E. Ash Street		Co-Investigator Name/Contact:  telephone: (    )    - e-mail:			
Description of Research: Composite pavement system composed of an open graded bituminous pavement (23-30% voids @1.5% asphalt cement) flooded with a cement based grout.				Keywords: composite pavement system, open graded bituminous pavement, cement grout			
Technical Review Panel Names:	TRP Telephone: (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    -	TRP Email:	Meeting Dates: /    / /    / /    / /    / /    / /    / /    /	Minutes Available?			
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: State DOT's, local agencies for asphalt areas prone to asphalt shoving.					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

**QUARTERLY PROGRESS REPORT (CONTINUED)**

Project Title: Resin Modified Pavement	Today's Date: 01/27/2006
	Function Code: IHR-R06
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Searching for field trial.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING: DEC 2005

Project Title: <b>Special Studies</b> <i>Lighting, Sign and Signal Structure Problems (R07-1)</i>		Today's Date: 1/19/06 Function Code: IHR-R07 FY 2006																					
QPR Author Name: Christopher Hahin, PE Telephone: (217) 782-0574    % Project Completed: 90%		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">Estimated Dates</th> <th colspan="4" style="text-align: center;">Calendar Year: 2005</th> </tr> <tr> <th style="width: 25%;">Task Title</th> <th style="width: 12.5%;">Start</th> <th style="width: 12.5%;">Complete</th> <th style="width: 8.3%;">JAN</th> <th style="width: 8.3%;">APR</th> <th style="width: 8.3%;">JUL</th> <th style="width: 8.3%;">OCT</th> </tr> <tr> <td></td> <td></td> <td></td> <td>MAR</td> <td>JUN</td> <td>SEP</td> <td>DEC</td> </tr> </table>		Estimated Dates		Calendar Year: 2005				Task Title	Start	Complete	JAN	APR	JUL	OCT				MAR	JUN	SEP	DEC
Estimated Dates		Calendar Year: 2005																					
Task Title	Start	Complete	JAN	APR	JUL	OCT																	
			MAR	JUN	SEP	DEC																	
Task 1: Investigate Thin Wall Aluminum Pole Failures		3/02	12/03	C																			
Task 2: Breakaway Couplings & Cast Iron Bases		7/02	6/04	C																			
Task 3: Investigate Luminaire & Pole Vibration		7/02	12/05	C																			
Task 4: Prepare Interim Reports		5/02	6/04	C																			
Task 5: Investigate Stress Concentrations in Handholes		1/04	12/05	I	I	C																	
Task 6: Propose New Pole & Base Designs		6/04	6/05	I	I	I																	
Task 7: Recommend Changes to ILDOT Std Specs		6/04	12/05	I	I	C																	
Task 8: Discuss new transformer base designs with TX DOT and FL DOT		10/04	9/05	I	I	I																	
Task 9: Discuss and test brass breakaway couplings With TTI and other states		12/04	6/06	I	I	I																	
Task 10:		/	/																				
Principal Investigator Name/Contact: Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:		P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704		Co-Investigator Name/Contact:  telephone: (    )    - e-mail:																			
Description of Research: Determine the cause of cracking in various light poles, sign and signal structures by measuring residual and live load stresses originating from design, fabrication, welding and fit-up of telescoping, flange and other joints; investigate failures of aluminum, stainless, and steel light poles & luminaires, breakaway couplings, and the feasibility of fatigue-resistant cast iron pole bases with low impact toughness and electrical handholes.				Keywords: light poles; luminaires; fatigue; aluminum; cast iron; stainless steel; signals; sign structures																			
<b>Technical Review Panel Names:</b> Mark Seppelt Jim Sterr Jim Sullivan Mike Renner Jim Schoenherr		<b>TRP Telephone:</b> (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    -		<b>TRP Email:</b>        																			
<b>Meeting Dates:</b> / / / / / / / / / / / / / /		<b>Minutes Available?</b>																					
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: Bureau of Operations; Bureau of Design & Environment																					

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Special Studies</b> <i>Lighting, Sign and Signal Structure Problems (R07-1)</i>	Today's Date: 1/19/06 Function Code: IHR-R07-1
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><i>Sep 2003:</i> A large number of tenon-top poles still under warranty failed during a windstorm in the Galesburg area, where peak winds were only 55-60 mph. Contract documents required poles to withstand 80 mph winds. Poles were subject to substantial deflections and vibrations, resulting in ruptures of poles, bases and breakaway couplings. A joint investigation of the causes was initiated by the Bureaus of Const, Design &amp; Environment, Materials &amp; Research, Bridges &amp; Structures, Districts 2 &amp; 4, and the Office of Chief Counsel. Areas of investigation include the design, materials and manufacturing techniques. Pole manufacturers Valmont and Union Metal maintain that the poles were designed in accordance with AASHTO standards. Preliminary calculations by BMPR indicate that the poles, per AASHTO equations, are become subject to critical vibrations at 35-45 mph, which were the predominant gust speeds during the windstorm. Prof. Nick Jones, of the University of Illinois Civil Engineering Dept., was also contacted to act as a consultant to the Department regarding further vibration investigations.</p> <p><i>Dec 2003:</i> A meeting was held with representatives of HAPCO, a leading manufacturer of aluminum light poles, and the Bureaus and Districts concerned with recent pole failures. HAPCO described the basis for the newest AASHTO specifications on pole design. Another meeting with the contractors, vendors and suppliers was conducted to resolve the need for immediate replacement of failed poles under warranty. Their final proposal for pole replacement is to be submitted in late Jan 04 for review by the Department.</p> <p><i>Mar 2004:</i> A theoretical analysis confirmed the field measurements of 4-5 g forces sustained by luminaires on the LeClaire Bridge. Trucks passing at 55 mph or more create a localized pulse of 8-10 ms duration, resulting in both deck and pole deflection. Using the approximation of deck and pole deflection angle through the rigid parapet, g-forces were correlated to be a direct function of truck weight, speed and luminaire height.</p> <p><i>Jun 2004:</i> A final draft report regarding the luminaire failures on the I-80 Le Claire Bridge was completed, and reviewed by various officials in the Bureaus of Materials &amp; Physical Research, Design &amp; Environment, and Bridges and Structures. The final report was revised, and included virtually all of the reviewer's comments. Final printed report scheduled for release to Districts 2 and 4 in August, 2004.</p> <p><i>Sep 2004:</i> Final report submitted to District 2 regarding the I-80 luminaire failures. Recommendations included: 5g fixture is a minimum; shorten poles to 27.5 ft high; use galvanized steel poles which have better damping capacity; consider use of shaded parapet lighting; coat the pavement decking with masonry coatings with higher reflectivity. Sources of high-g lighting were also explored. A pooled fund proposal was placed on the Internet to solicit assistance from other states with similar luminaire vibration problems.</p> <p><i>Dec 2004:</i> Reviewed proposal of manufacturer (sent from BDE) to changes of hand hole geometry, including: full penetration welds, thicker casting, and grinding of weld profile. Would slightly increase fatigue category, but high stress concentration at hole in pole would still be excessive at high wind speeds.</p> <p><i>Mar 2005:</i> Reviewed proposal of University of Illinois Dept of Civil Engineering regarding cyclic testing of aluminum, steel and fiber composite 40 ft light poles to determine amplitude, frequency and damping effects.</p> <p><i>June 2005:</i> Extensive changes to Article 1069 of Illinois Standard Specifications were submitted to the Bureau of Design regarding materials and light pole &amp; tower design. Deflection limits in high mast poles and hand hole stress concentrations were subject to in-depth analysis. Report of results expected in next quarter.</p> <p><i>Sep 2005:</i> Single piece lighting pole design, consisting of a telescoping cast base, with handhole, then welded to the tapered pole, was discussed with D&amp;E Electrical Unit. Design has fewer sites for fatigue or overload from high winds. I-80 luminaire vibration study published. Awaiting report of vibration studies of aluminum, steel and fiberglass poles from the University of Illinois.</p> <p><i>Dec 2005:</i> Final draft report received from the Univ of IL regarding pole vibration studies. Feedback received from pole manufacturers regarding proposed changes to IL Standard Specifications; extensive changes to be placed in Special Provision form.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Evaluation Of A Fiber Reinforced Polymer (Frp) Composite Bridge Deck Material. Ibrc # II98-08			Today's Date: 1/10/2006				
			Function Code: IHR-R07				
			FY 2006				
QPR Author Name: Tom Winkelman		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2940	% Project Completed: 75%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Literature search for FRP composite materials		1/2000	12/2001	C	C		
Task 2: Innovative feature workplan preparation		3/2000	10/2001	C	C		
Task 3: Observe bridge deck construction		7/2001	12/2001	C	C		
Task 4: FRP material testing		1/2002	12/2006	I	I		
Task 5: Bridge deck instrumentation		3/2003	8/2003	C	C		
Task 6: Construction report		4/2002	9/2002	C	C		
Task 7: Performance evaluations		12/2001	12/2006	I	I		
Task 8: Final report		10/2006	6/2007				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelman@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		Co-Investigator Name/Contact:  telephone: (   )   - e-mail:			
Description of Research: This research will involve evaluating the construction and field performance of a fiber reinforced polymer (FRP) composite bridge deck material. Tasks include literature searches on composite materials and their related material and physical properties, observation of the construction process and field evaluation of the completed bridge deck, and laboratory testing of samples from the composite material. A construction report and final report will be written to document the performance of this experimental material.				Keywords: bridge deck, fiber reinforced polymer composite, "DURASPAN"			
Technical Review Panel Names:	TRP Telephone: (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -	TRP Email:	Meeting Dates: / / / / / / / / / / / / / /	Minutes Available?			
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: IDOT - BBS, LR & S, Districts New material for smaller bridges New specifications					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of A Fiber Reinforced Polymer (Frp) Composite Bridge Deck	Today's Date: 1/10/2006 Function Code: IHR-R07
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>2003 1st Quarter          Color, gloss, and hardness tests were completed on the remaining material samples. Compression, tensile, and flexural strengths along with resin content and water absorption will be completed in the second quarter.</p> <p>2003 2nd Quarter          Compression, tensile, and flexural strength testing was completed. Resin content and water absorption tests were also completed. Plans were started for the instrumentation of the bridge deck and girders with strain gauges.</p> <p>2003 3rd Quarter          The bridge deck and select girders were instrumented with strain gauges. A static load test was performed and the strain levels recorded. It was determined that the deck and girders are acting as a composite unit.</p> <p>2003 4<sup>th</sup> Quarter          An annual performance survey was completed in December. All material tests for this year were completed.</p> <p>2004 1<sup>st</sup> Quarter          Color, gloss, and hardness tests were completed on the remaining material samples. Compression, tensile, and flexural strengths along with resin content and water absorption will be completed in the second quarter.</p> <p>2004 2<sup>nd</sup> Quarter          Resin content and water absorption tests were completed. Compression, tensile, and flexural strength tests were delayed due to scheduling and availability of the laboratories.</p> <p>2004 3<sup>rd</sup> Quarter          No activity.</p> <p>2004 4<sup>th</sup> Quarter          An annual performance survey was completed in December, and the annual reporting form was submitted to the FHWA. All material tests for this year were completed.</p> <p>2005 1<sup>st</sup> Quarter          Color, gloss, and hardness tests were completed on the remaining material samples. Compression, tensile, and flexural strengths along with resin content and water absorption will be completed in the second quarter.</p> <p>2005 2<sup>nd</sup> Quarter          Resin content and water absorption tests were completed during this quarter.</p> <p>2005 3<sup>rd</sup> Quarter          No activity.</p> <p>2005 4<sup>th</sup> Quarter          The annual performance distress survey was completed, and the necessary reporting forms completed. Areas of distress and split joints were found on the underside of the FRP bridge deck at some of the manufactured joints. The compression, flexural, and tension testing was completed as the test machines in the laboratories are operational again.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Experimental Features In A Pcc Pavement: Fibrous Concrete, Tining, No-Seal Joints, And Alternative Dowel Bars. Experimental Feature II 99-04			Today's Date: 1/10/2006				
			Function Code: IHR-R07				
QPR Author Name: Tom Winkelman		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2940	% Project Completed: 100%			JUL	OCT	JAN	APR
Task Title	Start	Complete	SEP	DEC	MAR	JUN	
Task 1: Literature search for similar research	1/2000	10/2000	C	C			
Task 2: Observe construction practices	7/2000	12/2000	C	C			
Task 3: Construction report	10/2000	4/2001	C	C			
Task 4: Field evaluation of project performance	7/2000	06/2005	C	C			
Task 5: Final report	06/2005	12/2005	I	C			
Task 6:	/	/					
Task 7:	/	/					
Task 8:	/	/					
Task 9:	/	/					
Task 10:	/	/					
Principal Investigator Name/Contact: Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelmantj@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		Co-Investigator Name/Contact:  telephone: (   )   - e-mail:			
Description of Research: This research will involve the field evaluation of four different experimental features in a PCC pavement project. The concrete pavement will include polypropylene fibers for reinforcement, no-seal transverse pavement joints, uniform transverse tining, randomly spaced transverse tining, randomly spaced skewed tining, and some alternative materials for dowel bars. Literature searches on the various experimental features listed above. Observation of the construction process and regular field evaluations of the completed pavement. A construction report, interim report, and final report shall be written to monitor the performance of these features.				Keywords: Concrete, Polypropylene fibers, tining, no-seal joints, dowel bars			
Technical Review Panel Names:	TRP Telephone: (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -	TRP Email:	Meeting Dates: 12/14/1999 / / / / / / / / / / / /	Minutes Available? No			
Short Title & Date of Reports Available: Construction Report (1/1/2001)		End User(s) and Result(s) Expected: Illinois DOT New construction procedures New specifications					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Experimental Features In A Pcc Pavement: Fibrous Concrete, Tining, No-	Today's Date: 1/10/2006 Function Code: IHR-R07
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Progress to Date (Limit narrative to what fits on this page):

2003 1st Quarter  
No activity.

2003 2nd Quarter  
The second annual distress survey was performed in June. No significant distress was found.

2003 3rd Quarter  
No activity.

2003 4<sup>th</sup> Quarter  
No activity.

2004 1<sup>st</sup> Quarter  
No activity.

2004 2<sup>nd</sup> Quarter  
The third annual distress survey was performed in May. No significant distress was found. A request was made to District 2 for a copy of the QC/QA report from the construction of this project.

2004 3<sup>rd</sup> Quarter  
No activity.

2004 4<sup>th</sup> Quarter  
No activity.

2005 1<sup>st</sup> Quarter  
No activity.

2005 2<sup>nd</sup> Quarter  
The fourth annual distress survey was performed in May. No significant distress was found.

2005 3<sup>rd</sup> Quarter  
A draft of the final report was started during this quarter.

2005 4<sup>th</sup> Quarter  
The final report was completed during this quarter. The final report will not be published as a Physical Research Report; however, it will be submitted to the FHWA as an experimental features final report. The most significant conclusion from this project is that more time will be required to determine the performance of the experimental features. Five years is not enough time to predict the performance for pavement related items that are designed to last 20 years or more. It is recommended that these experimental features be revisited in 10 or 15 years as the pavement begins to approach its design life.



# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Hot Mix Asphalt Longitudinal Joint Sealants			Today's Date: 1/10/2006				
			Function Code: IHR-R07				
QPR Author Name: Tom Winkelman		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2940	% Project Completed: 50%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Literature Search of Product Use and Experience		5/2003	6/2004	C	C		
Task 2: Project Construction		8/2003	10/2003	C	C		
Task 3: Construction Report		1/2004	6/2004	C	C		
Task 4: Project Evaluations		10/2003	10/2008	I	I		
Task 5: Interim Report		1/2007	6/2007				
Task 6: Final Report		10/2008	6/2009				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelmantj@dot.il.gov		P. I. Organization Name/Address: Illinois DOT Bureau of Materials and Research 126 E. Ash Springfield IL 62704		Co-Investigator Name/Contact: Laura Shanley telephone: (217) 524 - 7269 e-mail:shanleyll@dot.il.gov			
Description of Research: The goal of this research is to evaluate the performance of two longitudinal joint sealants for hot mix asphalt pavements. The two products under evaluation are "J-Band" from Heritage Research Group and "Quik-Seam" from Hendy Products, Inc.. Documentation of the construction procedures and performance measures including density at the joint and permeability will be evaluated. Annual performance checks will be used to monitor the performance of the two materials.				Keywords: Hot Mix Asphalt, Longitudinal Joints, Sealants, J-Band, Quik-Seam, Density, Permeability			
Technical Review Panel Names: David Lippert Jim Trepanier Laura Shanley Tom Winkelman		TRP Telephone: (217) 782 - 2631 (217) 782 - 9607 (217) 524 - 7269 (217) 782 - 2940 ( ) - ( ) - ( ) -		TRP Email:		Meeting Dates: / / / / / / / / / / / / / /	
Minutes Available?							
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected:				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Hot Mix Asphalt Longitudinal Joint Sealants	Today's Date: 1/10/2006 Function Code: IHR-R07
Progress to Date (Limit narrative to what fits on this page):	
<p>2003 2nd Quarter          Research has just been initiated. Project has been selected on IL Rt. 26 in Stephenson County.</p> <p>2003 3rd Quarter          Three official projects have been selected and constructed as part of the research. The first project is located on Illinois Route 50 (Cicero Avenue) in District 1. The second project is located on Illinois Route 26 in District 2, and the third is located on Interstate 57 in District 1. All three projects were constructed during the third quarter. The first two projects incorporated both types of joint sealant, while the third project only used the J-Band material. All three projects were tested for field permeability at the joint, and were cored for laboratory testing.</p> <p>2003 4<sup>th</sup> Quarter          A fourth project was constructed on Interstate 70 during the third quarter and added to the research. This project used only the J-Band material. Laboratory testing and some initial work on the construction report were also completed during this quarter.</p> <p>2004 1<sup>st</sup> Quarter          Work on the construction report has continued. Field evaluations of the projects will be conducted this summer.</p> <p>2004 2<sup>nd</sup> Quarter          A field evaluation of the project on IL Rt. 26 north of Freeport was completed in May. No significant comparison results were found at this project.</p> <p>2004 3<sup>rd</sup> Quarter          Field evaluations were completed for the experimental projects constructed on Interstate 70 near Martinsville, Interstate 57 near Peotone, and Illinois Route 50 near Matteson. No significant comparison results were found on any of the projects. A construction report documenting all four experimental projects was completed.</p> <p>2004 4<sup>th</sup> Quarter          No activity to report.</p> <p>2005 1<sup>st</sup> Quarter          No activity.</p> <p>2005 2<sup>nd</sup> Quarter          Field evaluations were completed for the experimental projects constructed on Illinois Route 26, Illinois Route 50, and Interstate 57. Some parallel centerline cracking was noted in the J-Band section of Illinois Route 26. No significant comparison results were found on the remaining projects.</p> <p>2005 3<sup>rd</sup> Quarter          No activity to report.</p> <p>2005 4<sup>th</sup> Quarter          A field evaluation was completed for the experimental project on Interstate 70. No joint distress was found.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING: DEC 2005

Project Title: <b>Engineering and Technical Investigations</b> <i>Welded Notch Toughness Test (R09-1)</i>			Today's Date: 1/19/06				
			Function Code: IHR-R09				
			FY 2006				
QPR Author Name: Christopher Hahin, PE		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 782- 0574	% Project Completed: 90%			JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Apply welded notch test to high performance steels		1/01	6/02	C			
Task 2: Apply welded notch test to other steels and non-ferrous metals		6/02	9/06	I	I	I	I
Task 3: Write technical manual for fabricators & researchers for use of test		1/02	3/06	I	I	I	I
Task 4: Publish findings in ASM, AWS technical journals		2/03	3/05	C			
Task 5: Propose test for inclusion into ILDOT specs and AWS code		7/03	12/06	I	I	I	I
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:		P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704		Co-Investigator Name/Contact:  telephone: (    )    - e-mail:			
Description of Research: The welded notch toughness test determines the actual toughness of a welded joint by joining two beveled base plates with a small land area (4 mm typical) of similar or dissimilar metals. When welded together in a rigid fixture, they form a natural, sharp notch. Welding conditions can be controlled to measure the effects of voltage, amperage, travel speed, electrodes, different welding processes or various combinations of base metals. Beveling 30 deg on each plate results in a 60° included angle, providing a CVN-style weld joint; or, if one plate has a 45° bevel and the other is square-cut, the toughness of the HAZ can be found. Test fixture is portable, and provides high shrinkage restraint for welded plates.				Keywords: welded notch test; toughness; weld joints; weldments; steel; Charpy V-notch; heat-affected zone; HAZ			
Technical Review Panel Names:	TRP Telephone: (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) -	TRP Email:	Meeting Dates: / / / / / / / / / / / / / /	Minutes Available?			
Short Title & Date of Reports Available: "As-Welded Notch Toughness Test for Steel Weldments", <i>Welding Journal</i> , Vol 70, No 2, Feb 91, pp 47-54.; "Welded Notch Toughness Testing", <i>Advanced Materials &amp; Processes</i> , Feb 2005, pp 49-52.		End User(s) and Result(s) Expected: Bureaus of Bridges & Structures; AWS; ASTM; AASHTO					

Instructions for each field appear at the bottom of the screen. For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Engineering and Technical Investigations</b> <i>Welded Notch Toughness Test (R09-1)</i>	Today's Date: 1/19/06 Function Code: IHR-R11
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><i>Dec 2002:</i> Welded notch toughness testing of Duracorr (ASTM A1010 stainless steel) and ER309L weldments at 30 kJ/in heat input with 60° V-grooves and 4 mm land area notches show a uniform ASTM E23 Charpy style V-notch toughness of 60 ±3 ft-lbs in the temperature range of -10°F to +70°F. Weld metal impact was also 60 ft-lbs at 0°F, which is obtained by notching the machined, flat weld bead and impacting the natural notch side by the striker tup. This uniformity of CVN toughness at 60 ft-lbs in the range of -10°F to +70°F indicates that this weldment is still at the upper shelf of the sigmoidally-shaped energy absorption curve.</p> <p><i>Mar 2003:</i> The welded notch and HAZ notch toughness tests were included in Special Provisions specified for the IL83 &amp; US 45 Bridge over the Wisconsin Central RR to determine the effects of substituting materials, or changing certain essential variables, on the toughness of weldments of ASTM A710 Grade B high performance steel. Essential variables described in Section 5 of the AWS D1.5 Bridge Welding Code include: (a) changes in filler metals; (b) sizes of electrodes or their classification; (c) changes in polarity, heat input or gas shielding [e.g., change from CO<sub>2</sub> to argon-oxygen cover gases], and (d) preheat temperatures.</p> <p><i>June 2003:</i> Work on this project delayed due to higher priority efforts in D-1 and D-8.</p> <p><i>Sep 2003:</i> Work on this project delayed due to higher priority efforts in D-1, D-2, D-4 and D-8.</p> <p><i>Dec 2003:</i> Work on this project delayed due to higher priority efforts for D-1, D-2, D-4, D-8 and the Bureau of Design &amp; Environment.</p> <p><i>Mar 2004:</i> An abstract was forwarded to ASM International's Fabricated Structural Steel Symposium, to be presented in October 2004, outlining the use of the welded notch toughness in determining the toughness of weldments of A710 Grade B for use in general structural work.</p> <p><i>Jun 2004:</i> Abstract previously submitted was accepted by ASM International, and presentation of the topic was scheduled for delivery at the ASM International Materials Conference in Columbus, OH in October 2004. Work on an article regarding welding of ASTM A710 Grade B was started, intended for submission to the journal <i>Advanced Materials and Processes</i>.</p> <p><i>Sep 2004:</i> A technical paper was submitted and accepted for inclusion in the ASM International Conference on Fabricability of High Performance (HP) Steels in Columbus, OH, entitled "Welded Notch Toughness Testing of ASTM A710 Grade B HP Steel". The paper is scheduled to be published in the November issue of <i>Advanced Materials and Processes</i>.</p> <p><i>Dec 2004:</i> Publication delayed until Feb 2005 by ASM International. Sent graphic of cable-stay Mississippi Bridge in St. Louis to journal editor per her request; bridge to use HP steels.</p> <p><i>Mar 2005:</i> Article, "Welded-Notch Toughness Testing", authored by principal investigator, published in February, 2005 issue of <i>Advanced Materials &amp; Processes</i>, pp-49-52, in the "Tech Spotlight" section.</p> <p><i>June 2005:</i> An invited presentation was given at the Univ of Illinois Civil Engineering Seminar Series regarding the use of the welded notch toughness in qualifying weldments for ASTM A710 Grade B high performance steel.</p> <p><i>Sep 2005:</i> Discussed with Bureau of Bridges &amp; Structures inclusion of welded notch toughness test into Standard Specifications as a supplemental test to standard AWS tests.</p> <p><i>Dec 2006:</i> Work on this project delayed due to higher priority efforts in D-1.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING: DEC 2005

Project Title: <b>Engineering and Technical Investigations</b> <i>Development of a Tough Alloy Structural Steel (R09-1)</i>		Today's Date: 1/19/06	
		Function Code: IHR-R16	
		FY 2006	
QPR Author Name: Christopher Hahin, PE		Calendar Year: 2005	
Telephone: (217) 782- 0574	% Project Completed: 88%	Estimated Dates	
		JAN	APR
		JUL	OCT
Task Title		Start	Complete
		MAR	JUN
		SEP	DEC
Task 1: Perform weldability studies		7/00	6/02
Task 2: Investigate use in bridges, sign & signal structures; rebar		10/01	6/03
Task 3: Propose new ASTM or AASHTO specifications for use of alloy		1/02	9/04
Task 4: Prepare tech data document for applicability of ASTM A710 Grade B		5/02	6/06
Task 5: Machinability studies of high performance steels		9/03	12/05
Task 6: Determine temperature range for heat straightening for A710 Grade B		4/05	4/06
Task 7:		/	/
Task 8:		/	/
Task 9:		/	/
Task 10:		/	/
Principal Investigator Name/Contact: Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:		P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704	
		Co-Investigator Name/Contact:  telephone: (   )   - e-mail:	
Description of Research: Using an earlier high performance (HP) steel developed by Northwestern Univ. on behalf of FHWA and US Navy, its composition was modified by BMPR and ASTM Committee A01.02. This HP steel has 0.03-.09% C, with 1.3% Cu, 1.0% Ni, 0.7% Mn and 0.4% Si. Its toughness is typically 100 ft-lbs or more at sub-freezing temperatures. The alloy represents a major development in hot-rolled HP steels, not require quenching & tempering or other thermo-mechanical processing. Normalizing may be specified for very high toughness. The cost/ton is directly competitive with conventional weathering steel (ASTM A588). Application into various bridges and other structures requires further exploration.		Keywords: alloy steel; high performance; copper; nickel; low carbon; toughness; weathering steel; bridges; structures	
Technical Review Panel Names:	TRP Telephone: (   )   - (   )   - (   )   - (   )   - (   )   - (   )   - (   )   -	TRP Email:	Meeting Dates: /   / /   / /   / /   / /   / /   /
			Minutes Available?
Short Title & Date of Reports Available: "High Performance Copper-Precipitation Hardened Steel", <i>Microalloyed Steels 2002, ASM Intl Materials Solutions Conference</i> , 7-9 Oct 02, Columbus, OH		End User(s) and Result(s) Expected: Bureaus of Bridges & Structures; ASTM; AASHTO	

Instructions for each field appear at the bottom of the screen. For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Development of a Tough Alloy Structural Steel</b>	Today's Date: 1/19/06 Function Code: IHR-R16
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><i>Sep 2003:</i> Grinding studies of A709 Gr 70 HPS and A710 Grade B by Machining Research, Inc., indicate that finely ground surfaces can be obtained in high performance steels, which have less variability in the direction parallel to the grinding wheel than does conventional A36 structural steel. In the perpendicular direction, A36 shows a slightly more uniform surface compared to ground HP steels. The differences, however, are minor, where A36 has a mean surface roughness of <math>17.5 \pm 6.5</math> microinches; A709 Gr 70 HPS, <math>27.2 \pm 9.6</math>; A710 GradeB, <math>18.5 \pm 5.9</math>.</p> <p><i>Dec 2003:</i> Comparisons of the machinability of A36, A710 Grade B and A709 HPS 70W, using high speed steel and TiN coated end mills, is in progress at Machining Research, Inc. Interim report expected in Feb 04.</p> <p><i>Mar 2004:</i> Face milling studies of A710 and A709 high performance steels indicate a surprisingly superior finish with high performance steels vs. A36 when using a fly-cutter with carbide insert. Surfaces are equivalent to ground finishes. Roughness on A36 was expected compared its free-machining counterpart SAE 12L14 due to its greater number of laminated particles of carbide and ferrite (pearlite). Since both A709 and A710 have substantially lower carbon (0.08-0.10%C), it is thought that their more uniformly harder matrix makes the milled surface much smoother. In these steels, the fly cutter does not abruptly run into hard pearlite clusters, and then a softer ferrite, as in A36. For carbon steels with 0.20-0.40 %C, this results in a peak-and-valley cut. Also, the ductility of the chip in A36 also does not lend itself to an even surface cut. The results for A710 and A709 indicate that fly-cut milling virtually eliminates the need for grinding in most structural work; resulting in a significant cost savings.</p> <p><i>Jun 2004:</i> Machining Research has completed all the work on end milling of HP steels, including A710 Grade B, using high speed steel bits. Progress on end milling using carbide bits is proceeding, and a report is to be made available on end milling in July, 2004. Various standard and special drills are being acquired to complete the last phase of the experimental portion of this project.</p> <p><i>Sep 2004:</i> Machining Research provided a comprehensive report on the milling phase of the high performance (HP) steel machinability study. Compared to A36, A710 HP and A709 HP steels had better milled surfaces, and cutting them resulted in less wear on end mills, improving their life and cutting time. These improvements are attributed to the limited amount of iron carbide and more uniform distribution of hardness compared to conventional A36 structural steel.</p> <p><i>Dec 2004:</i> Progress is continuing on comparative studies of drilling of HP steels, based on twist and core drill wear. Estimated completion, late March or early April 2005.</p> <p><i>Mar 2005:</i> Industrial Steel of Gary, IN, selected as the fabricator for the IL-83 bridge over the CNRR. Inquiry as to whether heat straightening could be used to increase camber. Since no data is available as to effects of precipitation-hardening of this alloy on toughness, 700F was recommended as highest permissible temperature. Study to determine temperature effects contemplated. Principal investigator from Machining Research reports severe illness; no progress on drilling to date.</p> <p><i>Jun 2005:</i> Machining Research has acquired hollow point Hougen drills for high performance steel drilling study; principal investigator reports partial recovery from illness. Toughness tests conducted by Northwestern Univ indicate that heat straightening of A710 Grade B up to 1200F did not affect notch toughness, but will increase yield &amp; tensile strength, and a small decrease in ductility.</p> <p><i>Sep 2005:</i> Drilling tests still in progress at Machining Research. Toughness tests at 70F at BMPR of A710 Grade B subjected to 1 hr of exposure at 900F, 1000F, and 1050F showed only an 8% loss of the as-received average CVN toughness of 168 ft-lbs.</p> <p><i>Dec 2005:</i> No progress reported from Machining Research. Telephone and fax inquiries were sent on 1/17/06 to determine whether the principal investigator can perform work, or have one of his associates complete the remainder of the drilling studies. Offers to help in completing final report were also made.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Shrp Products Evaluation And Ltpb Support			Today's Date: 1/10/2006				
			Function Code: IHR-R19				
			FY 2006				
QPR Author Name: Tom Winkelman		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 782 - 2940	% Project Completed: 75%			JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Attend National and Local SHRP/LTPP meetings		1/1990	12/2009	I	I	I	I
Task 2: Maintenance of LTPP test sections within Illinois		1/1990	12/2009	I	I	I	I
Task 3: Performance testing of LTPP test sections within Illinois		1/1990	12/2009	I	I	I	I
Task 4:		/	/				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelman@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		Co-Investigator Name/Contact:  telephone: (   )   - e-mail:			
Description of Research: The objective of this study is to evaluate those Strategic Highway Research Program (SHRP) products that have been identified as having potential of being a benefit to the department. The primary benefit of this study will be the identification and implementation of those SHRP products that will be cost effective to the department resulting in cost-savings, increased service life, and/or safety improvements.				Keywords:			
Technical Review Panel Names:  David L. Lippert	TRP Telephone: (   )   - (217) 782 - 6732 (   )   - (   )   - (   )   - (   )   - (   )   - (   )   -	TRP Email:  lippertdl@dot.il.gov	Meeting Dates: /   / /   / /   / /   / /   / /   / /   /	Minutes Available?			
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: Performance Data Manuals of Practice New Procedures					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Shrp Products Evaluation And Ltpg Support	Today's Date: 1/10/2006
	Function Code: IHR-R19

Progress to Date (Limit narrative to what fits on this page):

2004 1<sup>st</sup> Quarter  
 Laboratory testing was completed for cores taken from Test Sections 175151, 179267, 175849, and 175423. Test results were reported to Stantec in February. Stantec performed a final round of testing for Test Section 175908 on Illinois Route 13 in District 9 as this section will be dropped from the program this summer.

2004 2<sup>nd</sup> Quarter  
 Traffic control was established for annual testing at 6 test section locations. Construction was started and completed for the new WIM Scale on Interstate 57 at the SPS-6 site in Pesotum.

2004 3<sup>rd</sup> Quarter  
 Traffic control was established for annual testing at 3 test section locations. The I-57 WIM scale was ground for smoothness, and the pavement profile was checked. The annual Illinois update meeting was held on August 27.

2004 4<sup>th</sup> Quarter  
 International Road Dynamics was selected as the contractor to install the I-57 WIM scale.

2005 1<sup>st</sup> Quarter  
 An on-site meeting was held with IRD to review the selected WIM installation site. Work has progressed on the necessary items needed to complete the installation. A letter was sent to each of the Districts with an LTPP site asking for future rehabilitation plans and asking them to update the BMPR with any maintenance activities to the sites. An LTPP project update presentation was made at the Pavement Engineers meeting.

2005 2<sup>nd</sup> Quarter  
 Work progressed on the requirements and scheduling of the WIM installation on Interstate 57 at Pesotum. A meeting was held with the RSC to coordinate the materials action plan for sampling of the SPS-6 site on Interstate 57. This sampling was postponed until summer 2006.

2005 3<sup>rd</sup> Quarter  
 The WIM installation and calibration was completed in late July through early September. Traffic control was coordinated for the RSC at the SPS-6 site as well as sites in District 4 and 2.

2005 4<sup>th</sup> Quarter  
 No activity to report.



## PROGRESS REPORT FOR THE QUARTER ENDING: DEC 2005

Project Title: <b>Integral Abutment Bridges</b>		Today's Date: 1/19/05					
		Function Code: IHR-R20					
		FY 2006					
QPR Author Names: Chris Volkman & Chris Hahin		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 782-0574	% Project Completed: 76%			JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Attach gages on piles, decks, diaphragms and girders		7/00	6/02	C			
Task 2: Collect strain gage & tilt sensor data		7/01	12/02	C			
Task 3: Propose and investigate improved geometry and details		1/02	9/03	C			
Task 4: Prepare Interim Reports		5/02	3/06	I	I	I	I
Task 5: Cyclic yielding of embedded subsize piles		10/02	7/04	C			
Task 6: Recommend Changes to ILDOT Design Specs		12/02	6/06	I	I	I	I
Task 7: Select candidate experimental bridge		7/05	11/05			I	I
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:		P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704		Co-Investigator Name/Contact:  telephone: (   )   - e-mail:			
Description of Research: In an integral abutment bridge, thermal expansion and contraction is absorbed by the piles supporting the abutment instead of expansion joints. In this project, integral abutments are instrumented with strain gages installed on the piles of various bridges at locations throughout Illinois at 8 different depths to observe the stresses induced by expansion and contraction. Other gages were mounted in the deck, on girders, and at the interface between the abutment and abutment diaphragm where gages are installed on the vertical reinforcement bars. Additional study will include improvement of present designs to decrease cyclic stresses sustained by pilings and abutment diaphragm.				Keywords: integral abutments; strain gages; driven piles; thermal expansion; contraction			
Technical Review Panel Names: Kevin Reichers David Greifzu Ralph Anderson		TRP Telephone: (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -	TRP Email:	Meeting Dates: / / / / / / / / / / / / / / / /	Minutes Available?		
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected: Bureaus of Bridges & Structures				

Instructions for each field appear at the bottom of the screen. For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Integral Abutment Bridges</b>	Today's Date: 1/19/06
	Function Code: IHR-R20
Progress to Date (Limit narrative to what fits on this page):	
<p><i>Sep 2002:</i> Discussions with personnel from the Bureau of Bridges &amp; Structures (BBS) indicated their desire to have the bridge approach slab connected to the abutment. Because of our concerns about contraction during cold weather, there should be an ability for the slab to remain connected, but provide expansion with lubricated dowels or other types of connectors. Pile behavior in various soils and their unpredictability have caused concern as to undetected cracking of pile caps, since they are not visible for inspection. Discussions were conducted about embedding small I-beams in concrete blocks of 8 cu ft, and cycling them to slightly beyond their yield strength. This would reveal how cracking spreads in the concrete. Further discussions were held with Kevin Reichers and Salah Khayyat of BBS regarding our proposals to separate the pile cap from the beam end cap with lubricated plates of austenitic stainless steel (AISI Types 304 or 316), permitting very substantial movements without creating any yielding phenomena in the pile cap.</p> <p><i>Dec 2002:</i> Preliminary outline developed for interim report. Construction and testing of small beam embedded in rigid concrete blocks delayed until Spring 2003.</p> <p><i>Mar 2003:</i> Work commenced on the interim report, summarizing the various characteristics of each site, outputs of strain gages at certain times of the year, and daily fluctuations. Test results indicate that behavior of the pile is dependent on the soil pressures of the subsoil horizons, and is not always a cantilever-shaped deformation with a point of fixity at a particular depth. In the Tennessee design, select backfill is used to obtain a more uniform deformation, although they reported yielding at the pile end cap.</p> <p><i>Jun 2003:</i> An interim draft report summarizing previous work has been prepared, and is presently undergoing review and revision. Completed draft for final peer review scheduled for Sep 2003.</p> <p><i>Sep 2003:</i> Work on this project delayed due to higher priority efforts in D-1, D-2, D-4 and D-8.</p> <p><i>Dec 2003:</i> Work delayed due to transfer of associate investigator Volkman to D-8.</p> <p><i>Mar 2004:</i> Work delayed due to higher priority Departmental work.</p> <p><i>Jun 2004:</i> Work delayed due to higher priority Departmental work.</p> <p><i>Oct 2004:</i> Work delayed due to higher priority Departmental work. Proposed semi-integral design should be incorporated into an Innovative Bridge project in the near future, preferably in D-8 since the previous assistant investigator transferred there. This recommendation will be incorporated into the final report to provide continuity to carry out these concepts.</p> <p><i>Dec 2004:</i> Work delayed due to higher priority Departmental work.</p> <p><i>Mar 2005:</i> Work delayed due to higher priority Departmental work.</p> <p><i>June 2005:</i> Inquiry made to David Greifzu of the Bureau of Bridges as to whether an integral abutment bridge design could incorporate designs recommended in this study as an experimental feature.</p> <p><i>Sep 2005:</i> Work delayed due to higher priority Departmental work in D-1.</p> <p><i>Dec 2005:</i> Work delayed due to higher priority Departmental work in D-1.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2006

Project Title: Mechanistic-Empirical Design Implementation & Monitoring For Flexible Pavements			Today's Date: 1/6/06				
			Function Code: IHR-R28				
			Project Number:				
QPR Author Name: Marshall R. Thompson		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 3930	% Project Completed: 50%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Provide technical support and cooperate with IDOT concerning M-E flexible pavement design.		07/05	06/06	I	I		
Task 2:		/	/				
Task 3:		/	/				
Task 4:		/	/				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Marshall R. Thompson telephone: (217) 333 - 3930 e-mail:mrthomps@uiuc.edu		P. I. Organization Name/Address: Department of CEE University of IL @U-C		Co-Investigator Name/Contact:  telephone: (   )   - e-mail:			
Description of Research: Mechanistic-Empirical (M-E)-based flexible pavement design concepts and procedures were developed in previous IHR Projects (IHR-510 and IHR-527) and have been implemented by IDOT. IDOT continues to support a variety of M-E design implementation and monitoring activities. The objective of this project is for University of Illinois staff to continue to provide technical support and cooperate with IDOT in these activities.				Keywords: Flexible Pavements; Mechanistic-Empirical Design			
Technical Review Panel Names: David Lippert	TRP Telephone: (217) 782 - 2631 (   )   - (   )   - (   )   - (   )   - (   )   - (   )   - (   )   -	TRP Email: LippertDL@nt.dot.state.il.us	Meeting Dates: /   / /   / /   / /   / /   / /   / /   /	Minutes Available?			
Short Title & Date of Reports Available: Letter memos/reports on as-needed/requested basis		End User(s) and Result(s) Expected: All IDOT Districts / Improved flexible pavement design					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: M-E Design Implementation & Monitoring For Flexible Pavements	Today's Date: 1/07/06
	Function Code: IHR-R28
<p>Progress to Date (Limit narrative to what fits on this page):</p> <ul style="list-style-type: none"><li>* Thompson provided responses to questions/comments received from IDOT concerning flexible pavement analysis and design.</li><li>* Thompson continued to interact with IDOT M&amp;PR in developing/improving PCCP Rubblization policies, specifications, construction procedures, M-E flexible pavement design concepts/procedures, and AC overlay thickness design concepts.</li><li>* Thompson is cooperating with IDOT in reviewing/modifying proposed Local Roads &amp; Streets M-E design procedures for FULL-DEPTH AC and Conventional Flexible Pavements. Thompson continues to review the March - 2005 BLR&amp;S Section 37 (Pavement Design). Review comments will be forwarded to IDOT.</li><li>* Thompson provided engineering services/advice to IDOT concerning the D-9 I-57 Rubblization/HMA Overlay project (Franklin - Williamson Counties).</li><li>* Thompson provided engineering services/advice to IDOT concerning the Lynch Road Rubblization/HMA Overlay project in District 5 (Danville area).</li><li>* Thompson developed/presented (in cooperation with Sam Carpenter) several topics at the IDOT M-E Flexible Pavement Design Seminar (November 28, 2005) for IDOT M&amp;PR Staff.</li><li>* Several critical inputs/policy decisions concerning M-E design of flexible pavements (Bureau of Design / Bureau of Local Roads and Streets) have been identified. Thompson is helping to consider these issues and Amy Schutzbach is coordinating IDOT's efforts to consider these issues.</li></ul>	

## PROGRESS REPORT FOR QUARTER ENDING DECEMBER 2005

Project Title: Validation Of Extended Life Pavement Design Concepts			Today's Date: 12/30/2005				
			Function Code: IHR-R39				
			Project Number:				
QPR Author Name: S.H. Carpenter		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 4188	% Project Completed: 50%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Laboratory Testing		07/2004	06/2005	I	I		
Task 2: Response Testing		07/2004	06/2005	C			
Task 3: Field Fatigue Testing		07/2004	09/2005	I	I		
Task 4: AC Overlay/Tack Coat Study		10/2004	05/2005	C			
Task 5: Artificial Neural Network (ANN) Back Calculation		07/2004	06/2007	I	I		
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Samuel H. Carpenter telephone: (217) 333 - 4188 e-mail:scarpent@uiuc.edu		P. I. Organization Name/Address: Dept of Civil and Envir. Engr 205 N Mathews, MC-250 Urbana, IL 61801		Co-Investigator Name/Contact: M. R. Thompson telephone: (217) 333 - 3930 e-mail:mrthomps@uiuc.edu			
Description of Research: This research will provide test data for dynamic modulus and fatigue for current IDOT mixes in accordance with the AASHTO 2002 data requirements for pavement design. The fatigue testing will validate fatigue algorithms and illustrate the existence and magnitude of a fatigue endurance limit. Constructed pavements will be tested for responses and fatigue behavior. Artificial Neural network technology will be investigated for use in interpreting FWD data to provide a more rapid and accurate method for obtaining layer moduli values.				Keywords: Extended Life, endurance limit, ANN, dynamic modulus, pavement responses			
Technical Review Panel Names: Scott Lackey Jim Trepaniert Richard Mauch Hal Wakefield Paul Neiderhofer LaDonna Rowden Amy Schutzbach D. Lippert Tom Winkelman		TRP Telephone: (217) 466 - 7263 (217) 782 - 9607 (618) 346 - 3300 (217) 492 - 4646 (217) 524 - 1651 (217) 782 - 8582 (217) 785 - 4888 (217) 782 - 6732		TRP Email: lackeysa@dot.il.gov trepanierjs@dot.il.gov mauchrc@dot.il.gov hal.Wakefield@fhwa.dot.gov niedernhoferpr@dot.il.gov rowdenlr@dot.il.gov schutzbacham@dot.il.gov lippertdl@dot.il.gov winkelmant@dot.il.govj		Meeting Dates: 09/04/2002 04/22/2003 03/04/2004 08/24/2004 11/08/2005 / / / /	
Minutes Available? Yes Yes Yes Yes Yes							
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected: IDOT pavement design engineers				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Validation Of Extended Life Pavement Design Concepts	Today's Date: 10/22/2005
	Function Code: IHR-R39

Progress to Date (Limit narrative to what fits on this page):

Task 1. Laboratory Testing. No further laboratory testing is planned. Initial reports have been submitted. The laboratory data is being analyzed.

Task 2. Response Testing. No ATLAS response testing was done. FWD response testing was conducted during this quarter

Task 3. Field Fatigue Testing. Over 43,000 load repetitions were applied to the 6 inch fatigue section. Fatigue cracking developed over the first 25 feet of the section during the past quarter. Crack maps and rut depth measurements have been taken during the testing. After repair to ATLAS, the section will be tested in the third quarter to induce failure in the remaining length of the section.

Task 4. Completed.

Task 5. Artificial Neural Network (ANN) Back Calculation. There are 6 sub-tasks on this element.

5a. Characteristics of Illinois Pavements. A research progress meeting was held October 27, 2005. Results of developed ANNs were reviewed and compared with measured FWD deflections for a number of field validation cases.

5b. Generating (ILLI-PAVE Finite Element Solutions - New ILLI-PAVE runs are currently being made for pavements on lime stabilized soils.

5c. Development of ANN Structural Analysis Models. The FWD field data have been reviewed as requested to consider and evaluate the effects of stripping on calculation of the asphalt concrete modulus.

5d. Validation of the ANN Models. Difficulties in validations and basin matching of predicted with measured, have been attributed to the reliability of the laboratory test data as well as the material property variabilities encountered in the field data. Models with "no thickness" have been developed for use when there is no information provided about pavement layer thicknesses. An effort to calibrate these models is currently being made using the field data.

5e. Preparing a User-Friendly Toolbox (software). Capabilities of ANN\_Pro v1.0 have been improved. Options for Excel spreadsheets with graphing capabilities have been provided to enhance the evaluation of the ANN outputs. These can be imported into WORD documents. An improved interface has been provided for novice users. The capability to run more than one model at a time has been added

5f. Final Report and Training/Implementation - No Activity

## PROGRESS REPORT FOR QUARTER ENDING DECEMBER 2005

Project Title: Traffic Operations Lab (Tol)			Today's Date: 1/5/06				
			Function Code: IHR-R43				
			Project Number:				
QPR Author Name: Rahim (Ray) Benekohal		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 244 - 6288	% Project Completed: 15%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Task 1: Signal Coordination & Timing Workshops:		7/05	7/06	I	I		
Task 2: TOL Web site and Computer Network:		7/05	7/06	I	I		
Task 3: Battery Back-up Systems testing and evaluations:		7/04	9/05	C			
Task 4: Task 4. Statewide Meetings		7/05	7/06	I	I		
Task 5: Task 5. Installation of Video Detection systems:		4/05	7/05	C			
Task 6: Task 6. Data Collection Procedure		7/05	10/06	I	I		
Task 7: Task 7. Data Analysis		7/05	9/07	I	I		
Task 8: Task 8. Final report		7/06	10/07		I		
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Prof. Rahim (Ray) Benekohal telephone: (217) 244 - 6288 e-mail: rbenekoh@uiuc.edu		P. I. Organization Name/Address: U of I Urbana Champaign 205 N. Mathews Ave. Urbana, IL 61801 (USA)		Co-Investigator Name/Contact: n/a telephone: (   ) - e-mail:			
Description of Research: The TOL activities are mainly focused on testing and evaluation of new traffic control devices, on investigative and solution oriented research to recommend countermeasures to problems faced in traffic operations, and on providing the hands-on training to the department and municipal employees as well as the students at the university. The main focus of this year's research is evaluation of video detection systems. Regular activities for hands-on training will continue.				Keywords: video detection, loop detection, traffic control devices; UPS for traffic signals, LED,			
Technical Review Panel Names:  Yogi Gautam Jim Schoenherr Jason Johnson		TRP Telephone: (   ) - (217) 782 - 3452 (217) 782 - 3450 (217) 557 - 2070 (   ) - (   ) - (   ) - (   ) -		TRP Email:  gautamyp@ schoenherrja@ johnsonjl@		Meeting Dates: / / 7/8/2005 9/1/2005 10/4/05 11/17/05 12/15/05 / /	
Minutes Available?  No No No No No							
Short Title & Date of Reports Available: UPS Evaluation Reports		End User(s) and Result(s) Expected: Evaluation of UPS, Loop detectors, and video detection systems					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Traffic Operations Lab	Today's Date: 1/05/06
	Function Code: IHR-R43

Progress to Date (Limit narrative to what fits on this page):

The scope of activities at TOL is broad and encompasses more than a specific research project. Some tasks listed on previous page are projects in the traditional sense and others are on going activities. The following summarizes the progress on each task.

Task 1: Signal Coordination and Timing (SCAT) Workshops:

Two SCAT workshops for the district and central office IDOT employees were conducted in Sept 2005 at TOL. Computer network connection to TOL was updated and Synchro software was installed on the server. Computers were tested to make sure all working and ready for the classes.

Task 2: TOL Web site and Computer Network:

TOL network was connected with fiber optics to the main ATREL building to have high speed internet connection. All PCs were linked to the internet through the new server.

Task 3: Battery Back-up Systems (BBS) testing and evaluations:

This task was the main focus of work at the lab last year. A report was approved and published in July 2005.

Task 4. Statewide Meetings

The yearly statewide Highway Lighting and Traffic Signals meeting was held on November 16-18, 2005. The meeting was hosted and presentations were made on the video detection study and BBS.

Task 5. Installation of Video Detection (VD) systems:

Three vendors provided their video detection systems for evaluation. A signal cabinet is installed on Route 45 to house the VD systems. The three cameras and 6 inductive loop detectors were installed. Computers and input/output devices to measure the performance of the VD systems were installed. The data collection equipment were tested and adjusted. A statewide Signal System Engineers meeting on the VD system installed was held on July 8th, 2005.

Task 6. Data Collection Procedure

Scenarios to collect data were decided in cooperation with IDOT staff. A variety of light, traffic, and weather conditions will be considered. An algorithm was developed to find errors in VD systems compared to loop detectors. The algorithm has been validated by viewing video images and the algorithm's output. A set of data was collected and processed. The results were sent to the vendors so they can fine tune the VD setting, if needed. Vendors came and fine tuned their systems. Further modifications are being made to the algorithm. Data collection began in November 2005.

Task 7. Data Analysis

The collected data is being analyzed and the errors will be quantified. Four errors are tabulated: false detection, missed detection, stuck-on call, and dropped call. Contributions of light, weather, and traffic parameters on errors will be determined.

Task 8. Final report

Prepare a final report to include the finding of the study.



# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Performance And Acceptance Of Self-Consolidating Concrete		Today's Date: 12/28/2005					
		Function Code: IHR-R44					
		Project Number:					
QPR Author Name: D.A. Lange		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 4816    % Project Completed: 90%				JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Literature Review		7/2003	1/2004				
Task 2: Selection of Candidate Mix Designs Using Illinois Material Sources		8/2003	4/2004				
Task 3: Evaluate Applications		8/2003	4/2005				
Task 4: Experimental Program I – Flow Characteristics		10/2003	4/2006	I	I		
Task 5: Experimental Program I – Segregation Study		10/2003	4/2006	I	I		
Task 6: Experimental Program II – Early Age Mechanical Performance		10/2003	4/2006	I	I		
Task 7: Experimental Program II – Long Term Mechanical Performance		10/2003	4/2006	I	I		
Task 8: Test Protocol and Acceptance Criteria		10/2004	6/2006	I	I		
Task 9: Coordination Meetings		7/2003	7/2006	C	C		
Task 10: Final Report		6/2006	7/2006				
Principal Investigator Name/Contact: Prof. David Lange telephone: (217) 333 - 4816 e-mail:dlange@uiuc.edu		P. I. Organization Name/Address: University of Illinois 2122 NCEL, MC-250 Urbana, IL 61801		Co-Investigator Name/Contact: Leslie Struble telephone: (217) 333 - 2544 e-mail:lstruble@uiuc.edu			
Description of Research: IDOT has expressed interest in developing SCC materials for use in precast/prestressed member construction and possibly for future use in cast in place construction. Coordination with Illinois precast industry and admixture companies will be maintained through this project. The study will use IDOT-approved materials for potential mix designs that will be used for evaluation of fresh and hardened properties of SCC. Test methods and protocols will be evaluated and acceptance criteria will be proposed. Partnership of IDOT and UIUC expertise serves the central goal of defining successful SCC mixtures and construction practices that can deliver acceptable material properties.				Keywords: SCC, performance, flow, segregation, creep, shrinkage			
Technical Review Panel Names: Brian Pfeifer, Chair    BMPR Doug Blades            FHWA James Krstulovich    BMPR Ken Lang                District 3 Kevin Riechers        BB&S Steve Worsfold        District 4		TRP Telephone: (217) 782 - 2912 (217) 492 - 4629 (217) 782 - 6733 (815) 434 - 8480 (217) 782 - 9109 (309) 671 - 3676 (   )       - (   )       -		TRP Email: PfeiferBA@dot.il.gov Doug.Blades@fhwa.dot.gov krstulovichjm@dot.il.gov langkr@dot.il.gov riecherskl@dot.il.gov worsfoldsj@dot.il.gov		Meeting Dates: 11/18/05 7/13/05 4/5/05 11/19/04 7/20/04 2/20/04 10/21/03	
Minutes Available? Yes Yes Yes Yes Yes Yes Yes							
Short Title & Date of Reports Available: SCC Prestressed Applications 4-14-05			End User(s) and Result(s) Expected: IDOT BMPR Final Report - June 2006				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Performance And Acceptance Of Self Consolidating Concrete	Today's Date: 12/28/2005
	Function Code: IHR-R44
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Project accomplishments to date include a review of the current literature and available test methods. Current trends in mix design have been evaluated and a database of over 150 concrete mixtures was compiled. Candidate control mixtures were selected that represent different strategies in SCC mixture proportioning. The mixtures include one SCC design suitable for PPC I-beams w/ VMA and a conventional I-beam mix design, as well as IDOT mixtures used in Peoria retaining wall projects.</p> <p>Laboratory testing is in progress to characterize material behavior in both the fresh and hardened states. UIUC began by fabricating test equipment for the various SCC methods. Segregation test methods involving eddy current, falling weights, and image analysis have been used in the laboratory for validation. A draft standard test method was developed for evaluating static stability using hardened concrete cylinders. A static segregation test probe has also been developed, which is a simple device to quickly measure static segregation in the field. For dynamic segregation, a tilted 6" x 6" x 6' wood trough is currently in use to examine flow over longer distances. Concrete with zero VSI from the slump flow test shows dynamic segregation in this test, which may indicate the test is more sensitive to dynamic segregation. Surface texture and tilt angle are being varied to simulate the field conditions and eliminate conditions that may affect dynamic segregation results. Field measurement is planned after design refinement.</p> <p>Early age creep and shrinkage measurements are completed for the candidate SCC mixtures. Autogenous shrinkage, thermal behavior, and internal relative humidity of SCC have been measured to assess the potential for early age cracking. A new experiment characterizes differential shrinkage stresses by measuring curling in an unrestrained beam and the relative humidity profile. A finite element model has been developed to characterize stress development at early age. The model has been validated using the differential drying shrinkage test. Current use involves applications of this model to different scenarios in the laboratory and the field. Long term creep and shrinkage characterization continues. Elastic modulus tests are completed for all materials.</p> <p>Laboratory measurements and computer modeling of differential shrinkage due to concrete segregation are complete. A layered finite element model was constructed to assess the impact of segregation on stress and differential shrinkage tests validated the model. Concrete core specimens will be taken from the UIUC strong wall in an effort to analyze dynamic segregation. The results will be studied using the segregation shrinkage model to determine the shrinkage potential in the wall concrete.</p> <p>Formwork pressure measurements continue in the laboratory and in the field. Work is continuing on an alternative field measurement system. Laboratory work is continuing to further quantify the factors affecting formwork. Analysis of field data is progressing to further refine a numerical model of form work pressure.</p> <p>This project has been an active partnership with the Bureau of Materials and Physical Research at IDOT. Regular meetings have been held to provide updates on research progress.</p> <p>The project is conducted by two 1/2-time research assistants under the direction of Prof. David Lange. These students are Matthew D'Ambrosia and Ben Birch. A third 1/2-time research assistant, Lin Shen, is studying fresh properties and segregation under the supervision of Prof. Leslie Struble.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2006

Project Title: Concrete Distress Identification			Today's Date: 12/28/2005				
			Function Code: IHR-R53				
			Project Number: R53				
QPR Author Name: Qiang Li		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 244 - 2355	% Project Completed: 25%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Measure F/T performance of aggregate used in Valmeyer concrete		07/2005	12/2005	I	C		
Task 2: review test records on aggregate		07/2005	12/2005	I	C		
Task 3: write final report on Valmeyer project		07/2005	12/2005	I	C		
Task 4: review mineralogy of chert		10/2005	12/2005	I	C		
Task 5: review alkali-silica reactivity of chert		10/2005	12/2005		C		
Task 6: review geologic origin of cherts occurring in sand deposits in Illinois		10/2005	/		I		
Task 7: examine cores from I-39 for evidence of ASR		09/2005	12/2005	I	C		
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Leslie J. Struble telephone: (217) 333 - 2544 e-mail: lstruble@uiuc.edu		P. I. Organization Name/Address: Civil and Environmental Engineering, University of Illinois, 2129 Newmark, 205 N. Mathews, Urbana IL, 61801		Co-Investigator Name/Contact:  telephone: (   ) - e-mail:			
Description of Research: The research work is to identify the cause of concrete distress observed in relatively new pavement in Valmeyer IL and to assess the alkali-silica reactivity of chert.				Keywords: concrete, distress, aggregate			
Technical Review Panel Names: Brian Pfeifer Kevin Burke		TRP Telephone: (217) 782 - 2912 (217) 785 - 5048 (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -		TRP Email: pfeiferba@dot.il.gov burkek@dot.il.gov		Meeting Dates: 7/13/05 12/16/05 / / / / / / / / / /	
Minutes Available? No Yes							
Short Title & Date of Reports Available: Valmeyer Petrographic Report Valmeyer Free-Thaw Report I-39 Petrographic Report			End User(s) and Result(s) Expected:				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Concrete Distress Identification	Today's Date: 12/28/2005
	Function Code: IHR-R53
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Although cores from Valmeyer showed evidence of expansion and cracking of aggregate due to freeze-thaw cycles, petrographic and XRD examination indicated that the pavement deterioration is due to alkali-carbonate reaction (ACR). Based on these results, Task 2, reviewing aggregate records, was decided to be unnecessary. Final reports on the freeze-thaw tests and petrographic and XRD examination have been completed. More detailed understanding of the ACR mechanism for Valmeyer samples may need further investigation in the future.</p> <p>Task 7, petrographic examination of cores from I-39, was added after the project was approved. While the concrete contained potentially reactive constituents, there was no direct petrographic evidence of alkali-silica reaction.</p> <p>The remainder of this project in 2006 and 2007 involves alkali-silica reactivity of chert. A survey has been completed of the mineralogy (chemical composition, phase composition, microstructure) of flint and chert in general and of chert in Illinois and of alkali-silica reactivity of flint and chert. Results were presented to the Technical Review Panel on 12/16/05. A review is underway on the geologic origin of cherts occurring in sand deposits in Illinois.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2006

Project Title: Illinois Center For Transportation (Ict)/ Deck Beams		Today's Date: 12/31/2005					
		Function Code: IHR-R54					
		Project Number:					
QPR Author Name: Dan Kuchma		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 1571   % Project Completed: 20%				JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Survey of Current State Practice		07/2005	11/2005	C			
Task 2: Survey of Practice in Other States		09/2005	02/2006	I	I		
Task 3: Review of Bases for Guidelines		10/2005	03/2006	I	I		
Task 4: Design of Research Program		10/2005	06/2006	I	I		
Task 5: Conduct Experimental Research		12/2005	03/2007		I		
Task 6: Analysis and Summary of Test Results		05/2006	06/2007				
Task 7: Produce IDOT Guidelines		04/2007	09/2007				
Task 8: Production of Final Report		07/2007	12/2007				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Dan Kuchma telephone: (217) 333 - 1571 e-mail:kuchma@uiuc.edu		P. I. Organization Name/Address: CEE Department, UIUC 205 N. Mathews Ave, Urbana, IL 61801		Co-Investigator Name/Contact: Chris Hart telephone: (217) 244 - 8791 e-mail:chart3@uiuc.edu			
Description of Research: Lifting loops for bridge decks typically consist of one or more 7-wire prestressing strands that have been bent into loops. Current national codes and handbooks do not provide guidance for the design of lifting looks for shallow members and consequently individual states and producers are using a variety of different methods. This has led to problems in the field including failure of loops and this poses a significant safety hazard. To address this concern, current practices are being reviewed and a range of lifting loop arrangements are being tested in order to develop a standard practice for the State of Illinois with potential national application				Keywords: lifting, safety, prestressed concrete, bridges			
Technical Review Panel Names: Brian Pfeifer Kevin Riechers Gary Kowalski John Ciccone		TRP Telephone: (217) 782 - 2912 (217) 782 - 9109 (217) 785 - 2914 (217) 782 - 9111 ( ) - ( ) - ( ) - ( ) -		TRP Email: pfeiferba@dot.il.gov riecherskl@dot.il.gov kowalskigm@dot.il.gov ciccconejl@dot.il.gov		Meeting Dates: 09/13/2005 / / / / / / / / / / / /	
Minutes Available? Yes							
Short Title & Date of Reports Available: Preliminary Test Plan 11/16/05			End User(s) and Result(s) Expected: BBS Develop new details for lifting loops				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Illinois Center For Transportation (Ict)/ Deck Beams	Today's Date: 12/31/2005
	Function Code: IHR-R54

Progress to Date (Limit narrative to what fits on this page):

**Task 1: Survey of Current State Practice**

Section 2 of the IDOT Prestressed Deck Beams Manual was reviewed to gather information controlling the design and placement of lifting loops. This included geometric and reinforcement details for 11 and 17 inch deep deck beams.

Using contact information provided by Brian Pfeifer, a survey was conducted of the current lifting loop practices of 5 producers. These included Egyptian Concrete (Gerry Broom), Prestressed Engineering Corporation (Dave Burkitt), County Materials (Mike Johnson), Iowa Prestress Company (Jeff Welter), and St. Louis Prestress (Jim Kovarik). The results from the survey were synthesized and used in conjunction with IDOT specified lifting loop configurations to select variables for the proposed first phase of the experimental research program. These included the number of strands, size and use of piping, shape of lifting loops, and diameter of lifting pins.

**Task 2: Survey of Practice in Other States**

At this time, only practices of the producers listed above have been reviewed. A broader survey will be conducted in the third quarter of this project.

**Task 3: Review of Bases for Guidelines**

The basis for the guidelines provided in the PCI Design Handbook is being reviewed.

**Task 4: Design of Research Program**

The experimental research program was proposed to be conducted in two phases. Phase I will consist of a preliminary testing program in which a broad range of lifting loop arrangements and connections will be investigated. The goal of this first series of tests is to identify problems in current practice and promising features of a standard. The second phase of the experimental research will be aimed at assessing the specific requirements and limits of potential standard practice(s).

A draft plan was developed for the preliminary testing program and this plan was reviewed by the IDOT technical panel. A total of 16 tests were proposed, one test in each corner of a 3' x 8' foot solid concrete slab. Two of the slabs will be 11 inches deep and two will be 17 inches deep. Variables in the test include the number of 7-wire strands (1 or 2), the shape of the loops (parallel or tied), the use of a pipe (none, 1/8" pipe, thinner electrical conduit), and the diameter of the lifting pin (hook, 2" diameter pin). Each slab will contain the minimum number of strands required for the associated depth of deck slab and the standard specified level of transverse and end reinforcement. In all tests, the lifting angle will be 45 degrees.

The test setup will consist of a central jack that rests on top of the deck slab at midspan and presses upwards on a 7 wire strand that is connected at one end to a test loop and on the other end to an over designed anchor at the far end of the slab. This is a simple self-equilibrating test setup that will produce lifting forces in end regions that well represent the forces that are applied in practice. The slabs will be cast and tested in the Newmark structural engineering laboratory.

**Task 5: Conduct Experimental Research**

The preliminary testing plan was reviewed by the IDOT technical review panel and the necessary changes in the testing plan were made. The construction of the test specimens is underway and testing is anticipated to begin in January of 2006.

## PROGRESS REPORT FOR QUARTER ENDING DECEMBER 2005

Project Title: Tack Coat Optimization For Overlays			Today's Date: 12/28/2005				
			Function Code: IHR-R55				
			Project Number:				
QPR Author Name: S. Carpenter and I. Al-Qadi		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 4188	% Project Completed: 40%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Establish Literature		07/2005	12/2005	C	C		
Task 2: Interface Simulation		04/2006	09/2007		I		
Task 3: Laboratory Evaluation		04/2006	03/2007		I		
Task 4: Modify ATLAS		01/2006	12/2006		I		
Task 5: Overlay Construction		04/2007	06/2007				
Task 6: Conduct Field Performance Testing		04/2007	12/2007				
Task 7: Data Analysis		07/2006	03/2008				
Task 8: Interim and Final Reports		06/2006	05/2008				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Imad Al-Qadi telephone: (217) 265 - 0427 e-mail:alqadu@uiuc.edu		P. I. Organization Name/Address: University of Illinois		Co-Investigator Name/Contact: Samuel H. Carpenter telephone: (217) 333 - 4188 e-mail:scarpent@uiuc.edu			
Description of Research: Perform a coordinated lab, computer simulation, and accelerated full scale testing to optimize tack coat type and application rate on PCC having different surface textures. Effect of HMA mix design will also be investigated				Keywords: Tack Coat, Interface, Overlay			
Technical Review Panel Names: Tom Winkelman Amy Schutzbach Dave Lippert Jim Trepanier Charles Weinrank Patty Broers		TRP Telephone: (217) 782 - 2940 (217) 785 - 4888 (217) 782 - 6732 (217) 782 - 9607 (217) 782 - 0570 (217) 782 - 3547 ( ) - ( ) -	TRP Email:	Meeting Dates: 08/30/2005 / / / / / / / / / / / /	Minutes Available? Yes		
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected: Evaluation of tack coat types and application rates and PCC surface effects				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Tack Coat Optimization For Overlays	Today's Date: 10/15/2006
	Function Code: IHR-R55
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>TASK 1- Current state of knowledge Literature survey of tack coat applications and interface shear strength characteristics for composite pavement systems has been completed. This chapter of the report will be completed by the end of January</p> <p>TASK 2- Interface simulations Computer simulation using ABAQUS has been initiated. This work will focus on theoretical models utilizing different interface models (Coulomb friction, springs, cohesive elements etc.). The identified model will be calibrated by laboratory test results (when will be available) and then validated with field results.</p> <p>TASK 3-Laboratory evaluation Testing fixture has been identified. Minor modifications are needed. Feasibility of using one of the available servo-hydraulic systems at ATREL is underway. The lab testing matrix has been developed based on the approved field testing matrix.</p> <p>Task 4. Documentation regarding heaters and controls used on other devices has begun to be collected.</p> <p>Remaining tasks are due to begin at a alter date.</p> <p>TASK 4-ATLAS modifications Search for the heating system has been completed. Companies contacted are Fostforia Industries, Calcana Industries, Mid-Valley Radiants and Industrials, and Vickers Industrial Sales and Solution: Fostforia and Mid-Valley do not provide such type of service. Calcana can only provide the heaters and the control system need to be purchased and installed separately. Vickers Industries can provide a complete system of heaters, software (to set-up, run, and monitor), and environmental chamber. Florida DOT has been using a similar system for their accelerated testing facility. Feedback from Florida DOT is positive.</p>	



## PROGRESS REPORT FOR QUARTER ENDING DECEMBER 2005

Project Title: Speed Photo Enforcement		Today's Date: 1/5/06					
		Function Code: IHR-R56					
		Project Number:					
QPR Author Name: Rahim (Ray) Benekohal		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 244 - 6288	% Project Completed: 5%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Task 1- Literature Review		7/05	10/05	I	I		
Task 2: Task 2- Select WZ and Collect Field Data		8/05	9/06	I	I		
Task 3: Task 3- Analyze Dist 7 WZ data		9/05	2/06	I	I		
Task 4: Task 4- Effects of Police and "YOUR SPEED IS" Sign on Speed		3/06	10/06				
Task 5: Task 5- Effects of SPE on Speed and Speed Variation		3/06	10/06				
Task 6: Task 6- Spatial effects of SPE on Speed in WZ		3/06	10/06				
Task 7: Task 7- Temporal effects of SPE on Speed in WZ		3/06	10/06				
Task 8: Task 8- Speeding tickets and Court Decisions		2/06	4/07				
Task 9: Task 9- Prepare Reports		1/07	6/07				
Task 10:		/	/				
Principal Investigator Name/Contact: Prof. Rahim (Ray) Benekohal telephone: (217) 244 - 6288 e-mail: rbenekoh@uiuc.edu		P. I. Organization Name/Address: U of I Urbana Champaign 205 N. Mathews Ave. Urbana, IL 61801 (USA)		Co-Investigator Name/Contact: n/a telephone: (   ) - e-mail:			
Description of Research: This study will evaluate the effects of using speed photo enforcement (SPE) systems on traffic flow characteristics and safety in work zones (WZ). The overall goal is to determine the effectiveness of SPE in work zones using criteria such as: speed, speeding tickets issued and fraction upheld as valid in courts. The net effects of SPE above and beyond the "typical" traffic control procedure IDOT uses in WZ will be determined. Effects of police presence, "YOUR SPEED IS" sign, and SPE van in work zone alone or in combination will be studied.				Keywords: work zone speed, photo speed enforcement, police presence, dynamic speed sign, photo radar, construction zone speed			
Technical Review Panel Names: Dennis Huckaba Mathew Mueller Mike Staggs Sharon Haasis John Benda Priscilla Tobias		TRP Telephone: (217) 782 - 8606 (217) 558 - 1793 (217) 492 - 4630 (217) 782 - 0551 (630) 241 - 6800 (217) 782 - 3568 (   ) - (   ) -		TRP Email: HUCKABADA@dot.il.gov MUELLERMW@dot.il.gov Mike.staggs@fhwa.dot.gov  HaasisSL@dot.il.gov jbenda@getipass.com tobiaspa@dot.il.gov		Meeting Dates: 10/2/05 / / / / / / / / / / / /	
Minutes Available? No							
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: effectiveness of photo speed enforcement in work zones					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Speed Photo Enforcement	Today's Date: 1/5/06
	Function Code: IHR-R56

Progress to Date (Limit narrative to what fits on this page):

This study had planned to collect data in summer/fall of 2005 assuming that the speed photo enforcement vans would be ready for deployment in July 2005. The delivery was delayed and data collection plan had to be postponed. The vans will be delivered in December 2005 and the data collection will be the construction season for 2006. Preparations for data collection and analysis have continued.

**Task 1- Literature Review-**

Review the literature on photo enforcement, speed and speeding in work zones.

**Task 2- Select WZ and Collect Field Data**

Two work zone sites will be selected for data collection. It is anticipated to collect data for seven different work zone conditions. Speeds will be measured at two locations within work zone to determine the spatial effects of SPE.

**Task 3- Analyze Dist 7 WZ data**

Data from IDOT District 7 where they used "YOUR SPEED IS" trailer was analyzed to find the immediate effects and the effects after a few weeks of using the trailer. A short report is prepared to be sent to IDOT is early January.

**Task 4- Effects of Police and "YOUR SPEED IS" Sign on Speed**

The speed reduction effects of police presence and "YOUR SPEED IS" sign will be determined in order to accurately isolate the effectiveness of SPE. Data will be collected when police presence or the sign is used individually and at the same time.

**Task 5- Effects of SPE on Speed and Speed Variation**

Analyze the data on speed and speed variation/uniformity to determine the effects of SPE on speed in WZ. All seven WZ conditions will be studied to determine the net effects of the SPE system. Multiple comparisons will be made among the seven cases.

**Task 6- Spatial effects of SPE on Speed in WZ**

Near the photo enforcement van drivers may reduce their speeds, but passing it they may increase their speeds. The effects of the system on speed at a point 1-3 miles downstream from the equipped van will be determined (spatial effect).

**Task 7- Temporal effects of SPE on Speed in WZ**

When police is present in WZ drivers often slow down, but when police leaves the WZ the speed often increases. This phenomenon may happen with SPE. We will collect data after the van is taken out of a WZ to determine the temporal effects of SPE.

**Task 8- Speeding tickets and Court Decisions**

Determine the number of speeding tickets issued at those two sites and trace a sample of those tickets to estimate the fraction of tickets that is upheld as valid at courts.

**Task 9- Prepare Reports**

Prepare a final report on study findings and seek its approval from the TRP. Prepare interim and quarterly progress reports.

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Evaluation And Implementation Of Improved CRCP And JPCP Design Methods For Illinois			Today's Date: 1/3/2006				
			Function Code: IHR-R57				
			Project Number:				
QPR Author Name: Roesler, Jeffery		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 265 - 0218	% Project Completed: 16%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Evaluation of DG2002 for Concrete Pavements		07/2005	06/2006		I		
Task 2: Laboratory Characterization of Material Inputs		01/2006	06/2007				
Task 3: Traffic Characterization		10/2005	10/2006				
Task 4: Field Survey Review		10/2005	06/2007		I		
Task 5: Calibration and Validation of Design Methodology		01/2007	06/2008				
Task 6: CRCP Model Refinements		10/2006	01/2008				
Task 7: Built-in Curl Characterization		10/2006	06/2006				
Task 8: Climatic Zone Study		01/2006	06/2006				
Task 9: Special Case Studies for JPCP		01/2006	06/2006		I		
Task 10:		/	/				
Principal Investigator Name/Contact: Jeffery Roesler telephone: (217) 265 - 0218 e-mail:jroesler@uiuc.edu		P. I. Organization Name/Address: University of Illinois 205 N. Mathews, MC-250 Urbana, IL 61801		Co-Investigator Name/Contact:  telephone: (   ) - e-mail:			
Description of Research: With the recent release of the Mechanistic-Empirical (M-E) Pavement Design Guide (DG2002), many states are evaluating its applicability against their existing design methods. IDOT already has an existing jointed plain concrete pavement (JPCP) design based on M-E principles. However, IDOT does not have a M-E based continuously reinforced concrete pavement (CRCP) design procedure. The objectives of the study are to refine the JPCP design method based on new findings from the past 15 years and to develop and implement a CRCP design process that IDOT can use for routine design.				Keywords: Concrete pavement design, concrete materials, JPCP, CRCP			
Technical Review Panel Names: Amy Schutzbach (Chair) David Lippert Tom Winkelman LaDonna Rowden Chuck Wienrank Paul Niedernhofer Hal Wakefield		TRP Telephone: (217) 785 - 4888 (217) 782 - 6732 (217) 782 - 2940 (217) 782 - 8582 (217) 782 - 0570 (217) 524 - 1651 (217) 492 - 4646		TRP Email: schutzbacham@dot.il.gov lippertdl@dot.il.gov  winkelmantj@dot.il.gov rowdenlr@dot.il.gov wienrankcj@dot.il.gov niedernhoferpr@dot.il.gov  hal.Wakefield@fhwa.dot.gov		Meeting Dates: 09/13/2005 / / / / / / / / / / / /	
Minutes Available? Yes							
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected: IDOT BMPR and Districts New CRCP Design Guide Improved JPCP Design Guide				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation And Implementation Of Improved CRCP And JPCP Design Methods	Today's Date: 10/11/2005 Function Code: IHR-R57
Progress to Date (Limit narrative to what fits on this page):	
<p>The work on the CRCP implementation this quarter was focused on evaluating and programming the 2002 M-E Design Guide (DG2002). A FORTRAN code is almost complete, which uses the DG2002 algorithms that are published in the NCHRP 1-37A reports. The DG2002 has broken up the CRCP punch-out prediction into seven modules as follows:</p> <p>Module 1: Time-dependent input parameters are processed.          Module 2: Mean crack spacing is calculated based on the input parameters.          Module 3: Mean crack width for each monthly increment, <math>i</math>, during design life is calculated.          Module 4: Calculate crack load transfer efficiency (LTE) for each monthly increment, <math>i</math>, during design life.          Module 5: Calculate number of efficient single/tandem axle loads (a total of 80 load levels) based on input traffic parameters for fatigue damage and shear loss computation.          Module 6: Calculate fatigue damage for each monthly increment, <math>i</math>, during design life.          Module 7: Calculate the number of punchouts/mile at the end of each month by using a calibrated model developed from LTPP database.</p> <p>The UIUC FORTRAN code is completed for the first 5 modules above with the remaining two modules (6 and 7) to be finished in January 2006. The main component missing from the FORTRAN code is the complex stress prediction algorithm (module 6), which was not released in the DG2002 report. A Westergaard corner solution will be used as a placeholder until a better solution is obtained. When the code is finished, a meeting should be held between IDOT to UIUC to go over the program and the potential areas of improvements or simplification of the predictive equations.</p> <p>During the past quarter, research on the jointed plain concrete pavement study has focused primarily on characterization of built-in curl and investigation stresses in typical ramp sections in Illinois, nonlinear temperature profile in slabs, and limit state design.</p> <p>In late October, the US-20 test section near Freeport was tested using the FWD to characterize built-in curl, load transfer, and material/support properties. This test section provided the research team with data to analyze the impact of joint spacing and both doweled and hinged joints on the level of built-in curl in a typical Illinois jointed plain concrete pavement section. However, this study was limited in that the section only utilized tied concrete shoulders, which are known to limit curling of the slabs due to the added restraint. The research team has developed built-in curl back calculation charts specific to the Freeport sections using finite element analysis and are currently in the process of compiling a technical note on these findings. Initial results show built-in curl levels equivalent to a temperature difference of -5 to -10°F in most cases.</p> <p>The research team has also begun evaluating stresses due to frictional base restraint in typical ramp sections. Due to the wide slabs (16') and tied concrete shoulders on both sides of this ramp lane, excessive stresses may develop leading to longitudinal cracking in some sections, depending on the level of restraint offered by the tied shoulders. During this quarter, several other new ideas were formulated for future implementation into a JPCP design method. The inclusion of nonlinear temperature profile (instead of a linear profile assumption) in the slab is not directly account for in any design guide but it can have a significant affect on the calculated slab tensile stresses. This method will be implemented into a usable algorithm in the first half of 2006. A limit state design process was also proposed as an alternative to a cumulative damage analysis. This method has the ability to handle extreme loading cases more easily than a traditional damage analysis.</p>	

## PROGRESS REPORT FOR QUARTER ENDING DECEMBER 2005

Project Title: Cost-Effectiveness And Performance Of Overlay Systems In Illinois			Today's Date: 12/9/2005				
			Function Code: IHR-R58				
			Project Number:				
QPR Author Name: Imad Al-Qadi/ Bill Buttlar		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 4188	% Project Completed: 50%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Survey Districts		07/2005	12/2005	I	I		
Task 2: Site Visits and Performance Data Gathering		07/2005	06/2008	I	I		
Task 3: Forensic Investigation		04/2006	06/2008				
Task 4: Laboratory Testing		07/2006	1/2008				
Task 5: Pavement Analysis		01/2006	03/2008				
Task 6: Demonstration Projects		01/2006	10/2007				
Task 7: LCCA		04/2007	12/2007		I		
Task 8: Preliminary Usage Guide		07/2007	06/2008	I	I		
Task 9: Project Deliverables		04/2007	06/2008				
Task 10:		/	/				
Principal Investigator Name/Contact: William G. Buttlar telephone: (217) 333 - 5966 e-mail:buttlar@uiuc.edu		P. I. Organization Name/Address: University of Illinois		Co-Investigator Name/Contact: Imad L. Al-Qadi telephone: (217) 265 - 0427 e-mail:alqadi@uiuc.edu			
Description of Research: Evaluate the cost-effectiveness of traditional overlay systems used in Illinois and to evaluate recent reflective crack control strategies through laboratory, field demonstration projects, and LCCA. A preliminary guide to assist the pavement engineer in the selection of rehabilitation techniques to control reflective cracking will be developed.				Keywords: Reflective Cracking, Crack Control, Interface, Overlay, Asphalt, LCCA, Life-cycle cost, rehabilitation			
Technical Review Panel Names: Joe Vespa Amy Schutzbach Dave Lippert Jim Trepanier Patty Broers		TRP Telephone: (217) 782 - 6538 (217) 785 - 4888 (217) 782 - 6732 (217) 782 - 9607 (217) 782 - 3547 ( ) - ( ) - ( ) -		Meeting Dates: 08/30/2005 12//2005 / / / / / / / /		Minutes Available? Yes Later	
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: Field demonstration project Overlay life cycle cost analysis Preliminary user guide					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Cost-Effectiveness And Performance Of Overlay Systems In Illinois	Today's Date: 12/09/2005 Function Code: IHR-R58
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Task 1. District Survey: A survey has been developed to identify potential projects for study (in addition to currently monitored pavements). The survey form was finalized during the December 16 meeting with PRP and will be distributed to the district through Joe. This collected information will be used to fill the matrix of evaluation. The research team will use IDOT's procedure for distress survey of an experimental section. The research team has already received some information from the Districts.</p> <p>Task 2: Site visits and Pref. Data: A site visit was made to I-80 in D3 last quarter, while this quarter a site visit was made to Mattis Ave. We will continue to make site visits in the upcoming quarter. Existing projects will be visited to update performance data, particularly transverse and longitudinal reflective cracking. New/potential projects will be visited to assess their feasibility for inclusion in the study, and where appropriate, evaluation sections and initial distress assessments will be conducted. The assessment will be conducted once a year. Jason Fields can help the UIUC team gain access to the available video logs.</p> <p>Task 7: A detailed review of the ITRC project and LCCA analysis methods used were presented to the UIUC research team by Professor Buttlar in the November 22 meeting. New spreadsheets are under development, which will expedite the analysis of new performance data. The UIUC team would like to host a discussion with IDOT at the next meeting with regards to the elements to include in the LCCA to be performed in this study. In particular, we would like to discuss items such as maintenance, future life cycles, and user delay costs.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Effectiveness Of Sealers And Laminates For Concrete Bridge Decks.			Today's Date: 1/10/2006				
			Function Code: IHR-R07				
			Project Number: ITRC                      FY				
QPR Author Name: Kelly Morse / Tom Winkelman		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 782 - 7218	% Project Completed: 55%			JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Literature Search of Previous Research		3/2002	3/2004	C	C	C	C
Task 2: Survey of Other States Experience and Procedures		3/2003	3/2004	C	C	C	C
Task 3: Collect Data from Experimental Features (IL02-01)		6/2002	6/2007	I	I	I	I
Task 4: Evaluate Collected Data (IL02-01)		6/2002	8/2007	I	I	I	I
Task 5: Evaluate Chloride Content Versus Corrosion Rate		6/2007	8/2007				
Task 6: Develop Product List of Accepted Sealers		8/2007	8/2007				
Task 7: Develop List of Applicable Bridges		8/2007	8/2007				
Task 8: Develop Tests for Sealer Performance and Approval		3/2002	7/2007	I	I	I	I
Task 9: Write Report of Findings		9/2007	12/2007				
Task 10: Develop or Change Policy		9/2007	12/2007				
Principal Investigator Name/Contact: Kelly Morse telephone: (217) 782 - 7218 e-mail:morsekl@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		Co-Investigator Name/Contact: Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelmantj@dot.il.gov			
Description of Research: This research will investigate the performance of bridge deck protectants to inhibit the progression of deicing salts into concrete bridge decks. Evaluations of sealers, laminates, and bituminous membranes will be performed as part of this research effort. Visual surveys and chloride ion samples of the concrete bridge decks will be used as a performance evaluation of the protectants. Surveys and samples are scheduled at the initial time of construction or application, and continuing for a period of five years thereafter. The objective of the research is to develop an approved list of protectant materials, an application procedure, and an application timeframe for bridges.				Keywords: Concrete, Reinforcing Steel, Corrosion, Silanes, Siloxanes, Polymer Concrete, Bituminous Membranes, Chloride Ion			
Technical Review Panel Names: Dan Brydl - FHWA Dave Copenbarger IDOT D6 Doug Dirks - IDOT - BMPR Mark Eckhoff - IDOT - D4  Ken Lang - IDOT - D3  Carl Puzey - IDOT - BBS		TRP Telephone: (217) 492 - 4632 (217) 785 - 5306 (217) 782 - 7208 (309) 671 - 4463 ( ) - (815) 434 - 8480 ( ) - (217) 785 - 4511		TRP Email: BrydlD@igate.fhwa.dot.gov CopenbargerDA@dot.il.gov DirksDA@dot.il.gov EckhoffMS@dot.il.gov  LangKR@dot.il.gov  PuzeyDC@dot.il.gov		Meeting Dates: 3/22/2002 8/27/2002 4/29/2004 / / / / / / / /	
Minutes Available? Yes Yes Yes							
Short Title & Date of Reports Available: Eval. of Sealers and Laminates for Protection of Bridge Decks			End User(s) and Result(s) Expected: IDOT policy for the future use of sealers and laminates.				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Effectiveness Of Sealers And Laminates For Concrete Bridge Decks.	Today's Date: 1/10/2006 Function Code: IHR-R07
Progress to Date (Limit narrative to what fits on this page):	
<p>2003 4<sup>th</sup> Quarter          Data collection and analysis was completed on 18 structures in District 5.          Background research was started on appropriate laboratory tests for sealer / laminate qualification.          The information database was updated with test results and general information.</p> <p>2004 1<sup>st</sup> Quarter          District reports and year-end analysis for 2003 was completed.          Background work continues on appropriate laboratory tests for sealer / laminate qualification.          The information database was continually updated.</p> <p>2004 2<sup>nd</sup> Quarter          Data collection was completed for one structure in District 6, and a visual inspection was completed for the six bituminous membrane structures in District 2. Preparation work was completed for the upcoming annual sampling and surveying of the structures in the study.</p> <p>2004 3<sup>rd</sup> Quarter          Sampling was completed for all structures currently in the study. The samples are currently being tested in the chemistry laboratory for chloride content. Results and summaries will be added to the database as soon as they become available. An update was given at the annual Bridge Maintenance Engineer's meeting held in Quincy.</p> <p>2004 4<sup>th</sup> Quarter          District reports and year-end analysis for 2004 was completed. The information database was updated. The process to select appropriate laboratory tests for approval of these products was started. Sealer recommendations were made to District 8 for the Clark Bridge in Alton.</p> <p>2005 1<sup>st</sup> Quarter          Special provisions were created for two contracts in District 8, and for one contract in District 4. The laboratory testing procedures were decided upon, and five products from the approved list of bridge seat sealers were requested for the first round of testing. A list of potential control structures from Districts 7, 8, and 9 was requested from the Bridge office. Two or three structures from each of these Districts will be sampled this summer in an attempt to get a state-wide coverage for the research effort.</p> <p>2005 2<sup>nd</sup> Quarter          Laboratory testing procedures were started on six products selected from the approved list of bridge seat sealers. A database was created to track the laboratory testing results and for future comparison with field performance of the products. Chloride sampling was completed on 2 structures in District 6, 1 structure in District 4, and 12 structures in District 5.</p> <p>2005 3<sup>rd</sup> Quarter          Chloride sampling was completed on structures in Districts 2, 3, and 5. A presentation was given at the annual Bridge Maintenance Engineers meeting on the status of the project. Laboratory testing of the trial sealers continued.</p> <p>2005 4<sup>th</sup> Quarter          Chloride sampling was completed for the one structure in District 1. Laboratory testing of the trial sealers is complete and a determination of appropriate tests for future lab testing is under way. Chloride analysis in the chemistry lab continued for the samples collected in the field.</p>	



## PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Evaluation Of Aluminum Highway Sign Truss Design Details And Review Of Traffic Structures Standards			Today's Date: 12/21/05				
			Function Code: IHR-R37				
			Project Number: ITRC      FY 04				
QPR Author Name: Douglas A. Foutch		Estimated Dates		Calendar Year: 2005			
Telephone: (217) 333 - 6359	% Project Completed: 85%			JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Experimental and analytical investigation of Structure 1-Type I-A		3/04	10/05	I	I	C	
Task 2: Experimental and analytical investigation of Structure 2-Cantilever		3/04	8/05	I	I	I	C
Task 3: Experimental and analytical investigation of Structure 3 - Type II-A		3/05	10/05	I	I	I	I
Task 4: Experimental and analytical investigation of Structure 4 - Type III-A		3/05	12/05	I	I	I	I
Task 5: Experimental and analytical investigation of Structure 5 - A.M.S. sign		5/05	11/05	I	I	I	I
Task 6: Laboratory tests of connection specimens		6/05	10/05			I	I
Task 7: Laboratory and analytical study of damping systems		6/05	10/05			I	I
Task 8: Evaluation of design standards for aluminum sign structures		9/05	12/05			I	I
Task 9: Final report		11/05	1/06			I	I
Task 10:		/	/				
Principal Investigator Name/Contact: Douglas A. Foutch telephone: (217) 333 - 6359 e-mail:dfoutch@uiuc.edu		P. I. Organization Name/Address: University of Illinois 801 South Wright Champaign, Illinois 61820		Co-Investigator Name/Contact: James LaFave telephone: (217) 333 - 8064 e-mail:jlafave@uiuc.edu			
Description of Research: The objectives of the project are to measure and understand the behavior of highway sign trusses and details, verify current design standards for these structures, and if necessary, recommend changes to current design standards. This will require measurement of the response of five sign structures under wind and truck gust loading, measurement of strength of representative connections in the laboratory, and analytical studies. Five sign structures will be studied.				Keywords: aluminum sign structures, wind loads, design standards			
Technical Review Panel Names: Jon Edwards Myron Hodel Chris Mehuys Aaron Weatherholt		TRP Telephone: (217) 782 - 3586 (217) 782 - 3451 (217) 524 - 3320 (217) 785 - 5312 ( ) - ( ) - ( ) - ( ) -		TRP Email: HODELMJ@dot.il.gov EDWARDSJJ@dot.il.gov  MEHUYSCH@dot.il.gov  WeatherholtAA@dot.il.gov  BROERSPA@nt.dot.state.il.		Meeting Dates: 3/9/05 / / / / / / / / / / / /	
Minutes Available? Later							
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected:				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title:	Today's Date: 12/21/05
	Function Code: IHR-R37
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>We have almost finished studying all of the structures that we will investigate. Structure 1 (Type I-A) is located on the westbound lane of I72 near the 134 mile post. Structure 2 is a cantilever structure located on the eastbound lane of I72 at the 144 mile post. Structure 3 (Type II-A) is located on the eastbound I72. We have finished taking data on these three signs. We have developed analytical models of all three signs which very accurately represent the actual sign structures. We have also studied the effects of the damping units installed the structures. The damping is very low but also very evident on the cantilever sign equipped with the dampers with longer cables (floppy dampers). There is no added damping for structures equipped with the short cables. We have completed writing the draft report for the cantilever structure and about 90% of the draft reports for the Type I-A and II-A structures. The only remaining job is to check the effective gust factor used in the design calculations. We have placed instrumentation on Structure 4 (Type III-A) located on southbound I-55 near Lincoln. Preliminary and truck gust tests have been completed. We finally got some good wind at the site after waiting for three months for a good wind to complete our measurements. Wiss Janney and Elstner has completed the data acquisition on Structure 5 which supports a V.M.S and is located near Bloomington. We have received the data from them and are currently studying this sign bridge. We are having difficulty getting the natural frequencies of the analytical model to match those measured in the field. An interim report will be written for each task given above. These will be summarized in the final report. We proposed some weld details for study in the lab. These were approved. It was recommended that we start with a sign structure that has already been taken out of service and we agreed. J. LaFave will be overseeing this task for the project. Prof. LaFave and Jennifer Rice have been studying two signs that have been taken out of service and had some cracked welds. Based on some preliminary studies on some of the older sign structures it may not be necessary do do destructive tests on joints. There is strong evidence that vortex induced vibration of slender members was a strong contributor to the problem. We will be sending results of these studies shortly. We would like to complete the study of the old sign structures and damping by January, 2006. Task 7 has been redefined as approved by the Technical Review Panel through e-mail discussion. We will be studying the performance of the dampers that are currently being used by IDOT. As mentioned above, sometimes they work and sometimes they do not. At the completion of this task we will be better able to recommend damper specifications for each sign type. We have done extensive testing of two damper types in our lab. We are currently analyzing the data. We should have preliminary results to report in the next month. One important piece of information that we have discovered is that it seems that the current AASHTO design equations predict smaller stresses in the main members than those measured in the field. We would like to have more time to study these results before reporting them. We would like to request a no-cost extension to June 30, 2006.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING DECEMBER 2005

Project Title: Investigation Of Select Lrfd Design Factors Through Instrumentation Of Bridge Bearings		Today's Date: 1/12/06					
		Function Code: IHR-R38					
		Project Number: ITRC N/A FY 05					
QPR Author Name: Brad Cross		Estimated Dates		Calendar Year: 2005			
Telephone: (618) 650 - 2648    % Project Completed: 80%				JAN	APR	JUL	OCT
Task Title		Start	Complete	MAR	JUN	SEP	DEC
Task 1: Bridge Selection and Instrumentation Plan		2/2004	9/2005	I	I	C	C
Task 2: Instrumentation Installation and Data Collection (first 6 bridges complete, second 6 in progress)		5/2004	6/2006	I	I	I	I
Task 3: Data Analysis and Final Report		8/2004	6/2006	I	I	I	I
Task 4:		/	/				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
Principal Investigator Name/Contact: Brad Cross telephone: (618) 650 - 2648 e-mail:bcross@siue.edu		P. I. Organization Name/Address: Southern IL Univ. Edwardsville Edwardsville, IL 62026-1800		Co-Investigator Name/Contact: Nader Panahshahi telephone: (618) 650 - 2819 e-mail:npanahs@siue.edu			
Description of Research: Instrumentation for 12 bridges along I-55 to determine the validity of select factors in the LRFD design procedures.				Keywords: LRFD, instrumentation, shear			
Technical Review Panel Names: Tom Domagalski Patty Broers Mark Gawedzinski		TRP Telephone: (217) 785 - 2913 (217) 782 - 3547 (217) 782 - 2799 ( ) - ( ) - ( ) - ( ) - ( ) -		TRP Email: DOMAGALSKITJ BroersPA gawedzinskij		Meeting Dates: 3/17/2004 6/11/2004 11/18/2004 3/8/2005 6/13/2005 10/11/2005 / /	
Minutes Available? Yes Yes Yes Yes Yes Yes							
Short Title & Date of Reports Available: Instrumentation Plan 6/11/2004			End User(s) and Result(s) Expected: IDOT and FHWA are the anticipated end users. Results will discuss measured bearing shear forces.				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Investigation Of Select Lrfd Design Factors Through Instrumentation	Today's Date: 1/12/2006
	Function Code: IHR-R38
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Static and dynamic testing on the first six bridges is complete, and long term data collection is also finished. These bridges are:</p> <p>059-0041 068-0049 068-0046 084-0107 054-0043 059-0041</p> <p>Six bridges along I-270/70 have been instrumented and tested. Long term (6 month) monitoring began by December 31, 2005 and six months will be completed by the end of June as scheduled. These bridges are:</p> <p>060-0319 060-0056 060-0028 003-0001 003-0004 003-0006</p> <p>Data analysis and coordination of the final report is now underway and we anticipate having our first draft to IDOT by May 1 so the TRP can review the work before the project is complete.</p>	